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ENTOMOLOGY
Vol. 11

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It has been decided to discontinue the Volume Index from this volume onwards. Each part of the Entomological Series of the Bulletin normally has its own index.

THE CLASSIFICATION OF THE ANOMALONINAE (HYMENOPTERA : ICHNEUMONIDAE)

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I. D. GAULD

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THE CLASSIFICATION OF THE ANOMALONINAE (HYMENOPTERA : ICHNEUMONIDAE)

BY

IAN DAVID GAULD

Commonwealth Institute of Entomology

Pp. 1–135; 252 *Text-figures*; 4 *Tables*; 2 *Charts*

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THE CLASSIFICATION OF THE ANOMALONINAE (HYMENOPTERA : ICHNEUMONIDAE)

By I. D. GAULD

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SYNOPSIS

A revised classification is proposed for the Anomaloninae on the basis of the genitalia (particularly those of the male) and various external characters, often previously unused. A hundred characters were examined in each type-species and an average linkage dendrogram has been constructed from the resulting similarity matrix. All the genera and subgenera are redefined and their interrelationships discussed. Two tribes and 35 genera, of which two are new, are recognized as valid. Two genera are divided into subgenera, two of which are new. Four previously unknown final instar larvae and a first instar larva are described. Keys are given to genera and subgenera, both for adults and for described final instar larvae.

INTRODUCTION

THE Anomaloninae are a large group of quite uncommon Ichneumonids which are distributed throughout all major zoogeographical regions of the world. Many species occur in afforested areas where they parasitize the larvae of a number of economically important insects. The majority of Anomaloninae are parasites of lepidopterous larvae, usually ovipositing in early instars and with the adult parasites emerging from the host pupa. One small tribe, the Anomalonini, are parasitic upon Tenebrionid larvae.

Adult Anomaloninae have been reared from a variety of hosts and individual species do not appear to be particularly host specific. For instance, *Agrypon flaveolatum* has been reared from pupae belonging to eight different families of Lepidoptera. There is evidence to suggest that it is the habitat preference of these insects which is the major limiting factor in their distribution (Townes, 1958; 1962; Gauld, 1973*b*) and that within any one particular habitat type they will oviposit into any suitable lepidopterous larvae.

During the study of the Anomaloninae it became increasingly obvious that the limits of many genera are poorly defined and, in consequence, difficulty is experienced in placing some species. By the examination of type-species and a number of other species which are referred to the various genera, it has been possible to define the genera. This part of the work (1968–1971) was duplicating that done by Townes (1971). Subsequent and more detailed study of this material and large numbers of undescribed species have necessitated the alteration of generic limits. Emphasis has been placed on previously unused characters and special attention has been paid to the structure of the genitalia, particularly that of the male. The structure of the male genitalia is in many cases characteristic of the various taxa. In the past many authors used differences in wing venation to facilitate generic separation. As there is considerable variation in the venation, even within a species, the more general descriptive form taken by these authors may prove unreliable. Measurement of the wings has enabled these characters to be quantified. By studying inter- and intra-generic variation it has been possible to relate species groups together, place several otherwise unplaced species and produce generic diagnoses that not only include many new characters, but outline variation occurring in other characters and discard some features as of little use for effecting generic separation.

Terminology in this work follows that of Richards (1956) except that the naming of wing cells follows the system proposed by Eady (1974). Terminology for larval structure follows that of Short (1959) and for the male genitalia that of Peck (1937). Where any confusion about the terminology employed could occur labelled figures are included. The description of microsculpture follows the nomenclature proposed by Eady (1968).

Certain points concerning the terminology of morphological structures must be mentioned here. The flagellum is defined as that part of the antenna distal to and not including the reduced third antennal segment, the anellus. The term mesoscutum is used for the large dorsal thoracic sclerite and not mesonotum. The definitive mesonotum includes the scutellum and the prescutum, which in Ichneumonidae is extremely reduced (Compere & Rosen, 1970). The term meso-

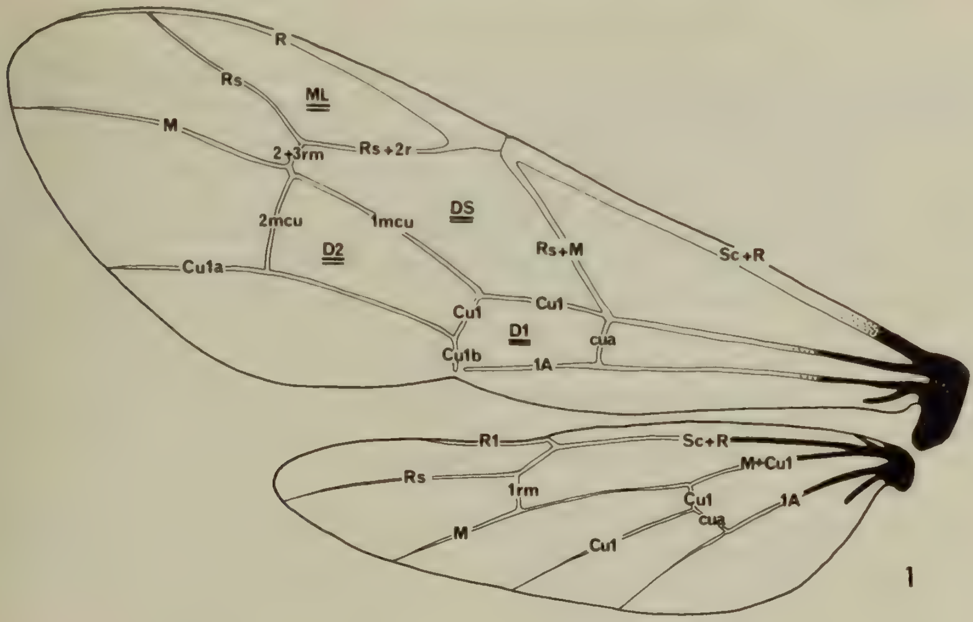

Fig. 1. Left fore- and hindwings of *Habronyx* (*Habronyx*) *heros* (Wesmael) labelled to show venation and wing cells. Abbreviations used for wing cells: ML marginal cell; DS discosubmarginal cell; D1 first subdiscal cell; D2 second discal cell.

sternum is used when referring to the ventral region of the mesothorax, although it is not certain that this area is the definitive mesosternum. The propodeum (which corresponds to the 'metathorax' of Morley, 1915 and Schmiedeknecht, 1936) is the original 1st segment of the abdomen. The remainder of the abdomen is termed the gaster. When referring to a particular tergite of the gaster, e.g. tergite 2, the number indicates the gastral, not abdominal, segment number.

The nomenclature of certain veins in the wings of Ichneumonidae is not wholly resolved. Some workers (Schmiedeknecht, 1936; Smith & Shenefelt, 1955; Townes, 1969) have used a derived Jurinian system for naming of veins. This system has many advantages, but in the present work the naming of veins follows the Richards (1956) interpretation of the Comstock-Needham system (Text-fig. 1). In the Anomaloninae only a single intercubital (*rm*) vein is present. This vein has variously been called either *2rm* or *3rm*, depending upon its position in relation to *2m–cu*. However, within a single species (*Habronyx heros*) *rm* has been found to be distal, opposite or proximal to *2m–cu*. Therefore to call this vein either *2rm* or *3rm*, depending upon its relative position, is to unjustifiably emphasize the importance of its position and to infer that in two specimens (with *rm* differentially placed in respect to *2m–cu*) the intercubital veins are not homologous. In many subfamilies that are possibly closely related to the Anomaloninae there is fusion apically between *2rm* and *3rm*. It is considered possible that within the Anomaloninae the intercubital vein may be 2 + *3rm* and this designation is used in the present work.

REVIEW OF THE PREVIOUS WORK

Prior to 1960 authors included the Anomaloninae within the subfamily Ophioninae as two separate tribes, the Anomalonini (which they called the Nototrachini) and the Therionini (which they called the Anomalini). This change in the position of the name Anomalonini has resulted from confusion over the use of the generic name *Anomalon* (see p. 85). The family-group name Anomaloidea was first used for the Ichneumonidae by Foerster (1868) but subsequent authors (Ashmead, 1901*a*; Schmiedeknecht, 1936) amended this to Anomalonini. Townes (1971) uses the names Anomalinae and Anomalini, thus reverting to the original Anomal- stem. However, Anomalitae was first used as a family group name in the Coleoptera (to include *Anomala* Samouelle) in 1850. Therefore under Article 55 of the *International Code of Zoological Nomenclature* the family-group name Anomalinae in the Ichneumonidae becomes a junior homonym. The amended form, Anomaloninae, which is already widely used amongst European workers would therefore appear to be the most suitable name for this subfamily.

In recent years the classification of the Ichneumonidae has undergone considerable modification. The subfamily Ophioninae of classical authors has been divided into a number of discrete subfamilies (Townes, 1969). Some modern authors (Short, 1959; Townes *et al.*, 1965) have combined the Therionini with the Anomalonini and elevated the resultant combination to the rank of a subfamily, the Anomaloninae.

Viktorov (1968) discussed the position of the Therionini at some length and concluded by suggesting that these insects should be retained in the Ophioninae as a tribe. This system of classification had been adopted by Aubert (1966), Smith & Shenefelt (1955) and Perkins (1959).

Short (1959) noted a marked degree of similarity in the structure of the cephalic capsule of the final instar larvae of the Anomaloninae and the Metopiinae. Both were observed to have a complete sclerotized epistomal arch, large pointed mandibles (except for the genus *Anomalon*) and lack a hypostomal spur. Townes (1971) has interpreted these similarities as being indicative of a phylogenic affinity between the two subfamilies. However, this resemblance may be due, as Short (1959) and later Viktorov (1968) suggest, to evolutionary convergence resulting from identical modes of life of the larvae, which is the completion of development within the pupae of Lepidoptera. As the hypostomal spur serves as a base for the insertion of the muscles used by the larvae to move the head whilst spinning a cocoon, one might expect that within a group which completes development within the host pupa, and in consequence spins only a thin cocoon, there might be a reduction or even the loss of the hypostomal spur. Similar reduction of the hypostomal spur is found in an unrelated group, the Ichneumoninae, which also complete their development within the host pupa.

In the last comprehensive work dealing with the Ichneumonidae (Townes, 1973) the Anomaloninae are treated as a separate subfamily and placed adjacent to the Metopiinae.

MATERIALS STUDIED AND METHODS USED

In this work every attempt has been made to examine as many specimens as possible from the various genera. A number of species from different zoogeographical regions have been examined so as to avoid biasing the interpretations overmuch in favour of the fauna of any one particular region. The bulk of the material examined is from the collections and accessions of the British Museum (Natural History) (hereafter abbreviated to BMNH); the Hope Department of Entomology, Oxford; the Australian National Insect Collection, Canberra (ANIC); the Queensland Museum (QM); and the author's personal collection. When only a small amount of material was examined mention of this is made in the text.

Three main methods of examination of material have been utilized in this work. Firstly, the genitalia of males and females were examined for characters. Secondly, certain characters, such as relative lengths of wing veins have been quantified, and thirdly, a phenetic investigation of the interrelationship of the various taxa was undertaken.

Preparations of the female genitalia were made by removing the terminal abdominal segments from an insect relaxed overnight in a box dampened with 2 per cent phenol solution. These segments were macerated in 10 per cent potassium hydroxide solution at 100°C and subsequently dehydrated through 30, 50, 70, 90 and 100 per cent ethanols, cleared in xylene and mounted in Canada balsam.

Examination of the male terminalia proved to be somewhat more difficult. Dried material was difficult to interpret due to the complex folding which occurred in the aedeagal membranes. Whenever possible fresh material or spirit preserved material was used, but this type of material was not available for many tropical specimens examined.

Several methods of reconstituting dried material were tried and comparison of the reconstituted material with fresh material was made. The most successful method for reconstitution was found to be the immersion of the genital capsule in 5 per cent potassium hydroxide solution containing 2 per cent ethanol for 10–15 minutes (depending upon the size of the specimen) at 80°C in a constant temperature water-bath. Preparation of the genitalia, particularly that of small species in non-alcoholic or a more strongly alkaline solution, caused serious distortion of the aedeagal membrane.

The genital capsule was dissected in 30 per cent ethanol containing 2 per cent glycerol and examined initially in glycerol so as to facilitate examination of the structure from all angles.

Drawings were made using high power (×400) and a squared eyepiece. During the course of this work a number of microstructures were observed on the aedeagus. These are referred to as tubercles when rounded convex structures, spines when acute conical structures and spinules when needle-shaped structures.

Morphometric comparisons between genera were based on the measurement of 15 specimens of each sex from the genera considered, except in the case of genera composed of a single or very few rare species. In these cases, measurement was made of all material available and if less than 30 specimens were measured an asterisk is placed against the figures given in the text. Specimens were selected to cover the size range of the genus considered and as many species as were available were examined. The resultant measurements were found to be most conveniently represented as indices (this method has been used for Formicidae by Bolton, 1974). The following indices have been found in some cases to be useful for separating the genera.

BAI Brachio-anal index (forewing)

$$\frac{\text{length of } Cu_1 \text{ between } cua \text{ and } 1m\text{–}cu}{\text{length of } 1A \text{ between } cua \text{ and } Cu_{1b}}$$

BI Brachial index (forewing)

$$\frac{\text{length of shortest distance between } Cu_1 \text{ and } 1A \text{ at extreme distal end of first subdiscal cell}}{\text{length of shortest distance between } Cu_1 \text{ and } 1A \text{ at extreme proximal end of first subdiscal cell}}$$

This quantifies the degree of explanateness of the first subdiscal cell.

CI Cubital index (forewing)

$$\frac{\text{length of } Cu_1 \text{ between } 1m\text{–}cu \text{ and } Cu_{1a}}{\text{length of } Cu_{1b} \text{ between } Cu_{1a} \text{ and } 1A}$$

This quantifies the references of earlier authors to ‘nervulus intercepted above, at or below the centre of the brachial cell’.

DAI Dorsal abdominal index

$$\frac{\text{length of dorsum of tergite 2}}{\text{length of dorsum of tergite 3}}$$

DBI Disco-brachial index (forewing)

$$\frac{\text{length of } Cu_1 \text{ between } cua \text{ and } 1m\text{–}cu}{\text{length of } 1m\text{–}cu \text{ between } Cu_1 \text{ and } 2 + 3rm}$$

ICI Intercubital index (forewing)

$$\frac{\text{length of } 2 + 3rm}{\text{length of } M \text{ between } 2 + 3rm \text{ and } 2m\text{–}cu}$$

LAI Lateral abdominal index

$$\frac{\text{length of dorsum of tergite 2}}{\text{apical depth of tergite 2 laterally}}$$

MI Marginal index (forewing)

$$\frac{\text{length of } Rs}{\text{length of } Rs + 2r}$$

NI Nervellar index (hindwing)

$$\frac{\text{length of } Cu_1 \text{ between } cua \text{ and } M}{\text{length of } cua \text{ between } Cu_1 \text{ and } 1A}$$

This quantifies references by earlier authors to 'nervellus intercepted above or below the centre'.

PI Petiolar index

$$\frac{\text{distance from anterior margin of petiolar spiracle to base of tergite 1}}{\text{distance from posterior margin of petiolar spiracle to apex of tergite 1}}$$

RI Radial index (hindwing)

$$\frac{\text{length of } Rs \text{ between } R_1 \text{ and } 1rm}{\text{length of } 1rm \text{ between } Rs \text{ and } M}$$

TI Trochanteral index (hind leg)

$$\frac{\text{length of trochanter measured medio-ventrally}}{\text{length of trochantellus measured medio-ventrally}}$$

Measurements of these lengths were made using an eyepiece micrometer at a magnification of ×100.

In the case of measurement of wing veins error can be introduced by failure to standardize exactly the distance measured. In all cases when the length of a vein between two other veins was measured, the distance recorded was the length of the margin of the vein between the two closest margins of the limiting veins. Thus the breadth of the other veins were not included in the measurement, nor was it necessary to estimate a mid point in the intersection of any two veins.

Classification of the Ichneumonidae is based primarily on comparative studies of the morphology of the adult insect and, as fossil evidence is scarce, this classification is essentially phenetic. The theoretical aspects of phenetic classification have been discussed at length by Sokal & Sneath (1963; 1973) and a number of their conclusions are particularly relevant to this study. If it is accepted that it is presumptuous to weight any one characteristic in favour of any other positive one, a more accurate interpretation of the suprageneric classification can be made if a large number of characteristics are considered.

From the genera of Anomaloninae under consideration a very large number of characters were considered and those showing little or no intergeneric variation were eliminated. As many of the genera are composed of a few or a single species, the biology of which, because of their rarity, has not been fully investigated, comparison of the immature stages has not been possible on a very large scale.

The characters selected were chosen so as to allow an insect to be scored as either a + or a —. This system of scoring is not meant to infer that a + character is in any way more significant than a — character. In a few cases intermediates have been found and these were scored as ± and were not considered to differ from either a + or a — character. In a very few cases full information was not available; for example, lack of material from either sex prevented the scoring of all genitalia characteristics. In these cases percentage similarities were calculated for the number of scored characters compared and the position of the incompletely scored genera is tentatively shown as dotted lines on the dendrogram.

The characters used, together with their + and — alternatives are listed below and definitions of the characters are included where necessary.

Character	Plus (+)	Minus (—)
00. Lower facial beak-like prominence	present (Text-fig. 165)	absent
01. Medio-clypeal tooth	present	absent
02. Lateral clypeal margin	dentate	without a tooth
03. Eye surface	pubescent	glabrous
04. Lower face centrally	produced	flat
05. Distance between orbit and anterior tentorial pit	less than length of malar space	equal to or more than length of malar space
06. Clypeal sculpture	coriaceous	punctate
07. Inner margins of eyes ventrally	parallel	convergent
08. Occipital carina posterior ocelli	close	distant
(Close is defined as ocelli less than ocellar diameter from occipital carina.)		
09. Interocellar distance	greater than orbital ocellar distance	less than orbital ocellar distance
10. Occipital carina medio-dorsally	complete	interrupted
11. Frons below median ocellus	vertically carinate	without carina
12. Frons between antennae	lamellate	not lamellate
13. Number of labial palp segments	four	three or less
14. Scape apex	almost truncate (Text-fig. 170)	strongly oblique (Text-fig. 172)
15. Length of pedicel	longer than scape	shorter than scape
16. Number of mandibular teeth	one	two
17. Shape of base of cardo	simple (Text-fig. 239)	lobate (Text-fig. 237)
18. Base of mandible	flanged (Text-fig. 164)	simple

Character	Plus (+)	Minus (−)
19. Intersection of genal and hypostomal carina	before mandible base	at mandible base or not joining
20. Head behind eyes	strongly narrowed	parallel or buccate
21. Flagellar segment 10 coloration	rufescent or yellow	black
22. White flagellar band	absent	present
23. Length of antennae	longer than body	not longer than body
24. Accessory carina on occiput	present	absent
25. Pronotum dorsally	long	short

(Long is defined as having median length equal to or longer than the distance from mid line to notaulus base.)

Character	Plus (+)	Minus (−)
26. Transverse dorsal pronotal crease	present (Text-fig. 208)	absent (Text-fig. 207)
27. Plane of dorsal surface of pronotum	subvertical	horizontal
28. Pronotal tooth	present (Text-fig. 205)	absent
29. Shape of lower margin of pronotum	truncate	acute
30. Notaulus	present and impressed	absent
31. Sternaulus	present and deep	absent or very shallow
32. Anterior mesonotal concavity	present (Text-fig. 208)	absent
33. Mesonotal curvature in profile	abrupt and angular (Text-fig. 206)	gently and evenly (Text-fig. 209)
34. Transverse mesoscutal suture	present (Text-fig. 188)	absent
35. Grooves before scuto-scutellar groove	present (Text-fig. 184)	absent
36. Propodeal shape	globose (Text-fig. 228)	not globose (Text-fig. 226)

(Globose is defined as shape when propodeum, viewed dorsally, is broader than long.)

Character	Plus (+)	Minus (−)
37. Shape of postscutellum	longer than broad	broader than long
38. Upper end of epicnemial carina	reaching above centre of mesopleuron	below centre of mesopleuron
39. Upper end of epicnemial carina	reaching anterior margin of mesopleuron	not reaching anterior margin of mesopleuron
40. Apical propodeal neck	long	short

(Long is defined as having the propodeal neck longer than the basal width of tergite 1.)

Character	Plus (+)	Minus (−)
41. Sculpture of propodeal neck	smooth and polished	reticulate or coriaceous
42. Shape of scutellum in profile	more or less flat	very convex
43. Fore coxae ventrally	transcarinate	smooth
44. Fore coxae laterally above trochanter	carinate	without carina
45. Posterior transverse carina of mesosternum	complete	absent or interrupted
46. Length of hind trochanter ventrally	longer than trochantellus	shorter than or equal to trochantellus
47. Shape of hind claw	curved less than 90°	geniculate (100°+)
48. Maximum extent of pecten on hind claw	reaching apex in both sexes	not reaching apex at least in ♂
49. Sexual dimorphism in hind claws	noticeable	not apparent
50. Second hind tarsal segment of ♂	explanate (Text-fig. 177)	not explanate at all
51. Flattened sensory hair on second hind tarsal segment	present	absent

Character	Plus (+)	Minus (−)
52. Number of calcars on mid tibia	one	two
53. Density of spines on fore tibial calcar	scattered (ten or less) (Text-fig. 174)	numerous (Text-fig. 175)
54. Apex of penultimate hind tarsal segment	extended beyond insertion of apical segment	simply truncate
55. Ratio of length of first hind tarsus to second hind tarsus segment in ♂	3·0+	2·5 or less
56. Ratio of length of first fore tarsus to fifth fore tarsus segment in ♂	1·2 or less	1·5+
57. Number of hamuli on R_1	five or less	seven or more
58. Lateral longitudinal carinae of scutellum	complete to apex	incomplete or absent
59. Last abscissa of Cu_1 in hind wing	present at least basally	absent or not discernible basally
60. Radial index	1·2+	1·19−
61. Last abscissa of *Rs* and *M* in fore-wing	entirely absent	present
62. Distal anterior angle of first subdiscal cell	very acute	obtuse
63. Shape of second discal cell	regularly pentagonal	irregular
64. Cubital index	0·8+	0·7−
65. Disco-brachial index	0·84+	0·83−
66. Brachio-anal index	1·0+	0·99−
67. Brachial index	1·5+	1·49−
68. Position of $2 + 3rm$ in relation to $2mcu$	distal	opposite or proximal
69. Intercubital index	1·1+	1·0−
70. $2m$–cu	present	entirely absent
71. Wing tip	infuscate	clear
72. Facial colour of ♂	immaculately yellow	black marked
73. Colour of scutellum compared with mesoscutum	contrasted	concolorous
74. Lateral abdominal index	3·0+	2·9−
75. Dorsal abdominal index	1·4+	1·35−
76. Ratio of distance from petiolar spiracle to posterior margin of tergite to inter spiracular distance	1·5+	1·4−
77. Lateral crease separating epipleuron 3	present	absent
78. Lateral crease separating epipleuron 2	present	absent
79. Length of valvula 3	shorter than tergite 2	longer than tergite 2
80. Shape of apex of valvula 1	abruptly constricted	tapered
81. Postero-dorsal prolongation of valvifer 2	present	absent
82. Curvature of valvula 2	weak	strong

(Weak is defined as having apex inclined at less than 10° to line through base.)

83. Host preference	lepidopterous larvae	coleopterous larvae
84. Caudal stalk and equatorial disc on ovarian egg	both present (Text-fig. 96)	either or both absent
85. Shape of gonosquamae	extended posteriorly	not extended

Character	Plus (+)	Minus (–)
86. Shape of gonolaciniae	slender and straight (Text-fig. 53)	stout and curved (Text-fig. 52)
87. Ratio of length of proximal apodeme of gonolacinia to median length of basivolsella	0·50+	0·49–
88. Distribution of distivolsellar teeth	central (Text-fig. 65)	peripheral (Text-fig. 77)
89. Gonolacinial teeth	present	absent
90. Shape of ninth abdominal sternite	quadrate	transverse
91. Syntergal fusion	complete	incomplete
92. Spinose ventral aedeagal membrane	present	absent
93. Shape of apex of aedeagus in profile	with dorsal lobe (Text-fig. 108)	without dorsal lobe
94. Continuous apical aedeagal membrane	present	incomplete
95. Shape of base of aedeagal paramere	evenly tapered (Text-fig. 44)	spatulate (Text-fig. 43)
96. Lateral extension of ventral aedeagal membrane	present	absent
97. Apical aedeagal tubercle	present (Text-fig. 133)	absent
98. Constricted extremity of ovipositor	long	short

(Long is defined as having narrowed apex more than 2·0 times as long as median vertical depth of ovipositor.)

99. Valvula 2 regularly perforated	yes	no

The characters of the genitalia (79–99) are discussed in some detail in the following section.

Insufficient specimens of the genera *Atrometoides*, *Bimentum*, *Brachynervus*, *Porizonopteron*, *Liopterna* and *Calcaneum* were available and therefore these genera have not been included in the numerical investigation.

The type-species of the several genera and subgenera were scored and comparison between each of the species was made. From these comparisons percentage similarities were calculated and the values have been tabulated in the form of a similarity matrix. (The original data have been deposited in the library of the BMNH.) From these results an average linkage dendrogram was produced (Text-fig. 249). Sokal & Michener (1958) used the weighted paired group method (WPGMA) to produce an average linkage dendrogram, but Sokal & Sneath (1973) no longer recommend this method, as when grouping is made a single genus arriving at a synapse is more highly weighted than any one of a group of genera it might join with. To avoid unnecessary weighting, the unweighted pair group method (UPGMA) has been used in this work and therefore

$$S_{(abc),\,d} = 1/3\,(S_{a,\,d} + S_{b,\,d} + S_{c,\,d})$$

where S = similarity and a, b, c and d represent type-species of genera.

THE STRUCTURE OF THE GENITALIA OF THE ANOMALONINAE

Many authors have alluded to the unusual form of the ovipositors of these insects, but the male genitalia have remained neglected since the work of Peck (1937) who commented on the distinctiveness of the two Therionine genera he examined.

The female

In the Ichneumonidae the female genitalia consist of three pairs of gonapophyses, the valvulae. One pair, the first valvulae, articulate with the first valvifers of the eighth abdominal (7th gastral) segment. The other two pairs, the second and third valvulae, articulate with the second valvifers of the ninth abdominal segment. In the living insect the first and second pairs of valvulae are intimately associated and form the ovipositor, whilst the third valvulae, which characteristically articulate terminally on the second valvifers, are compressed and form the ovipositor sheath.

The first valvulae are elongate styliform structures with the distal ends bearing from one to many teeth (Text-figs 8–17). The second valvulae are slightly shorter and mediodorsally, along their entire length, fused. The first valvulae interlock ventrally with the second to form a tube, down which (in most Ichneumonidae) the egg is passed. The third valvulae are transversely striate and externally hirsute (Text-fig. 2). They apparently serve to protect the ovipositor.

Many of the larger (20 mm+) Anomaloninae have the extreme apex of the ovipositor markedly constricted to facilitate oviposition into small first or second instar lepidopterous larvae. There is usually a distinct dorsal subapical notch present (Text-figs 18–20). In the past authors have often placed considerable emphasis on the presence or absence of a subapical ovipositor notch, but in the present subfamily there has been found to be a considerable amount of variation in the shape of the ovipositor. Whilst the majority of genera have a well developed dorsal notch, in *Parania* the apex of the ovipositor is hastate, and strongly laterally compressed, and in *Pseudanomalon*, the ovipositor is apically simply acute (Text-fig. 28). In the majority of genera the ovipositor is rather short, not longer than the length of the dorsum of the second gastral tergite and usually only about as long as the apical abdominal depth. In the genera *Trichomma*, *Philodrymus*, *Podogaster*, in some Nearctic species of *Agrypon*, and in the Anomalonini the ovipositor is longer than the second tergite.

The apices of the first valvulae of the Therionini show a considerable range of variation in shape between the genera. Most genera have the first valvulae slender with the apical 0·1 abruptly constricted, and with the extreme apex bearing between seven and ten minute teeth (Text-figs 10–11). In all Anomaloninae there is a single small irregularly triangular articulated plate, the valvillus (the Hemmplättchen of Oeser, 1961) about 0·15 of the length of the valvula from the valvular apex (Text-fig. 3). These structures have been observed in several other subfamilies of Ichneumonidae by Aubert (1958), Oeser (1961) and Rogers (1972). In living specimens of *Heteropelma calcator* the valvillus projects internally into the egg cavity of the ovipositor. Rogers noted that in *Venturia canescens* the valvillus (=projection) grips the egg in position within the cavity immediately before oviposition.

In the Anomalonini and also in *Parania* the apex of the first valvula is simply acute and the extreme apex bears four or five teeth (Text-figs 8, 12). The valvular apex of *Therion* is elongately acute and bears seven widely spaced teeth (Text-fig. 10), whilst that of *Philodrymus* and *Podogaster* are unusual in being shortly acute with a distinct subapical impression and only a single apical tooth (Text-fig. 16). In *Pseudanomalon gracile* the valvular apex is elongately acute, similar to that of *Therion*, but the valvillus is unusual in being positioned on a large swelling (Text-fig. 14).

The second valvulae are more uniform within the subfamily. The apex is often constricted and the extreme tip is usually weakly decurved. In most genera a distinct subapical notch is present dorsally, but this is noticeably less conspicuous in smaller species. A nodus may occasionally be present and is particularly evident in *Heteropelma* and *Therion* (Text-figs 18, 24). The second valvulae of *Parania*, *Pseudanomalon* and *Ophionellus* are simply acute apically (Text-figs 25, 28, 29) and that of the last genus is perforated by numerous regularly arranged holes throughout its entire length. This is possibly a modification to reduce weight, for in this genus the gaster is exceptionally elongate. The length of the narrowed valvular apex varies considerably from genus to genus, being longest in *Heteropelma* and shortest in some species of *Barylypa* (Text-figs 18, 19).

In *Anomalon*, as in most other Hymenoptera, the third valvulae articulate with the most posterior end of the second valvifers (Text-fig. 4), but in the Therionini the third valvulae articulate subterminally on the second valvifers (Text-figs 5-7) and there is a distinct process, the dorsal apodeme, which extends dorsally and posteriorly to the point of insertion of the valvulae (Text-fig. 2). Although little work has been done on the female genitalia of the Ichneumonidae it would appear that this structure is peculiar to the Therionini. Investigation of other groups thought to be related to the Therionini has revealed that only in some Metopiinae is there a similar process on the second valvifers, and in this subfamily the process when present is small.

Iwata (1958 ; 1960) has examined the structure of the ovaries and the form of the ovarian eggs in the Anomaloninae. The eggs of the genera *Heteropelma*, *Therion*, *Trichomma* and *Habronyx* are remarkable in having a caudal stalk and an equatorial disc, so that the egg is shaped not unlike the traditional Aladdin's lamp (Text-fig. 96). The eggs of other genera are without either an equatorial disc or a caudal stalk, or both. According to Tothill (1922) the function of the equatorial disc is to attach the egg to the inside of the host's integument. Tothill observed that *Therion morio* inserted its ovipositor deep within the young larvae of *Hyphantria* species, and attached an egg on to the body wall of the host opposite the point of insertion of the ovipositor. Askew (1971) states that *Heteropelma* is exceptional in ovipositing, not into the haemocoel but into the gut of lepidopterous larvae. At least in this case the equatorial disc of the egg cannot be used in the same way as Tothill suggested.

THE MALE

The male genitalia are considerably more complex than those of the female. The homology of the genitalia of male Hymenoptera with that of other insect orders is not resolved. It is not within the scope of the present work to discuss the possible homologies of the Ichneumonid male genitalia, and previous authors (Peck, 1937; Snodgrass, 1941) have discussed this matter at length. In the present work the terminology follows that of Peck, but this is not intended to imply that his interpretation of the genital structure is the more correct. Peck specifically investigated the genitalia of the Ichneumonidae, and it is therefore more convenient to utilize his terminology.

The male genitalia consist of a capsule formed by a pair of lateral gonosquamae, proximally surrounded by an annular gonocardo which is formed by the fusion of a pair of lateral semicircular sclerites. The gonosquamae enclose a pair of clasping organs, the volsellae (Text-figs 30–33). In the majority of Ichneumonidae the volsellae are sclerotized and only joined to the gonosquamae by a membrane. The volsellae are subdivided into two regions, the basivolsella and distivolsella. The former is a flattened region with a longitudinal, heavily sclerotized bar, the basivolsellar strut, which separates the basivolsella into two areas, the ventral and dorsal areas (Text-fig. 31). Partially fused to the distal margin of the ventral area is a hollow finger-like structure, the distivolsella. The distivolsella bears spines on its inner or clasping surface.

Associated with the distivolsella is the gonolacinia which in most Ichneumonidae is not fused with the volsella, although in some species of *Cremastus* Gravenhorst (Cremastinae) it is proximally fused to the ventral area of the basivolsella. The distivolsella and gonolacinia together effect clasping.

In the centre of the genital capsule is the intromittant organ, the aedeagus. The shape of the typical Ichneumonid aedeagus is a weakly depressed cylinder having its distal ends lengthened into a pair of rod-like projections, the parameres.

Included in this discussion of the male genitalia are the sclerites that are associated with the genital capsule. The genital capsule is supported anteriorly by the syntergum and the ninth abdominal sternite. The syntergum is usually an inverted U-shaped sclerite formed by the fusion of the ninth and tenth abdominal tergites. The posterior margin of the syntergum bears a pair of appendages, the pygostyles, which are probably homologous with the cerci of other insect orders. In some Ichneumonidae there is a dorsal longitudinal membranous area which divides the syntergum into a pair of syntergites. The ninth abdominal sternite is a concave almost quadrate sclerite laterally joined by membranes to the lower lateral corners of the syntergum.

Little use has previously been made of characters of the male genitalia of the Ichneumonidae. Some workers have found that it is possible to separate species within a genus (Townes, 1938; Pratt, 1939; Perkins, 1960) but other workers have found that the structure of the genitalia is not very useful for the separation of genera (Peck, 1937). Examination of the genitalia of the Anomaloninae has shown that it is usually possible to place a species in the most appropriate genus by examination of the male genitalia.

In the Anomaloninae there is generally a single syntergum present, but in some genera the syntergites are separated by a narrow mediodorsal longitudinal membranous area. The mid dorsal fusion of the syntergites is not apparently dependant upon the size of the insect as in *Habronyx* (*Habronyx*) species (length about 30 mm) and *Perisphincter* species (length about 10 mm) separate syntergites are present, whereas in *Heteropelma* species (length about 25 mm) and *Clatha* species (length about 7 mm) a single syntergum is present. Peck (1937) noted that *Therion circumflexum* had separate syntergites, but of the dozen or so specimens of this species examined during the preparation of this work, all were found to have a syntergum, with at the most a small V-shaped notch in the dorsal anterior margin. It is possible, therefore, that at least in some species there is intraspecific variation in the degree of fusion of the syntergites.

There was found to be a considerable degree of variation in the shape of the syntergum laterally, but this variation in shape was not found to be useful taxonomically. *Ophionellus* species, however, are exceptional in having the pygostyles inserted very much closer to the median dorsal line of the tergite than in other genera (Text-fig. 94).

The ninth abdominal sternites of the Anomaloninae were found to be rather evenly sclerotized (except in *Clypeocampulum*) rectangular transverse plates with slender median anterior apodemes. The posterior margin varies in shape from truncate to fully semicircularly rounded (Text-figs 38–42). There was found to be some degree of variation of the shape of these sclerites, even within a species, and thus their shape is of little taxonomic use. A similar variation in the shape of these sclerites has been noted for another Ichneumonid group, Phygadeuonini (Horstmann, 1967). The ninth abdominal sternite of *Pseudanomalon* was found to be exceptional in being very transverse, more than three times as broad as long, whereas in most genera this sclerite is about twice as broad as long. The ninth abdominal sternite of *Trichomma* is unusual in being quadrate with a median indentation in the posterior margin (Text-fig. 41). The general form of this sclerite amongst the Anomaloninae was found to be similar to those of the Ophioninae, and rather different from those of the Metopiinae which were found to have an anterior lobule in place of a median apodeme.

There is considerable intraspecific and intrageneric variation in the shape of the gonosquamae. Similar variation in the shape of these sclerites has been observed in another Ichneumonid group, the Hemitelini (Blunck & Kerrich, 1956). Generally the gonosquamae were found to be quite truncate (Text-fig. 33), but in one genus, *Ophionellus*, they were consistantly observed to be very elongate (Text-fig. 93).

The gonolaciniae are strongly curved in most genera and bear a number of small teeth along their distal apical margin. The majority of genera have the gonolaciniae of the form shown in Text-figs 59–63, although a few genera have distinctly shaped gonolaciniae. Those of *Anomalon* and *Neogreenia* are evenly curved, weakly pointed and with a narrow proximal apodeme (Text-fig. 50). The gonolaciniar apodeme varies considerably in length between the genera. In *Heteropelma* the apodeme is long, only weakly angled from the axis of the gonolacinia, whereas in *Therion* it is short and strongly angled from the gonolaciniar axis (Text-figs 52, 57). The gonolaciniae of *Anomalon biguttatum* are remarkable in being moderately elongate and weakly curved (Text-fig. 51). *Clatha* and *Atrometus* are exceptional in having the gonolaciniae very elongate, slender, almost straight, centrally swollen and bearing large spines (Text-figs 34, 53). The general form of the Anomalonine gonolacinia is similar to that of the Ophioninae, which although more acute terminally (Text-fig. 37) bear a number of spines on the distal apical margin. Both differ markedly from the Metopiinae where the gonolacinae bear lateral tubercles and often have a distinct fenestra (Text-fig. 35).

A comparison of the claspers of the three subfamilies Anomaloninae, Ophioninae, and Metopiinae has shown that whereas the modes of action of those of the former two subfamilies are fundamentally similar, that of the latter differs markedly. In the Anomaloninae and Ophioninae, the clasping face of the distivolsella is somewhat ridged and this ridge bears spines. Clasping is effected between this ridge and the distal apical teeth of the gonolacinia (Text-figs 31, 32). In the Metopiinae the clasping face of the distivolsella is planar and bears a large number of well developed conical teeth. The gonolacinia has the distal edge obliquely truncate with a large number of minute tubercles arranged laterally. Clasping is effected between the distivolsellar teeth and the apico-lateral corner of the gonolacinia (Text-figs 35, 36).

The volsellae of the Anomaloninae are completely sclerotized (Text-figs 30–33). The dorsal area is more or less absent and the dorsal margin of the volsella is formed by the basivolsellar strut. This strut has a small basal apodeme and is distally planar at the articulation with the gonolacinia. The distivolsella is intimately fused to the ventral area of the basivolsella.

The clasping face of the distivolsella varies considerably and the form of this face is a useful taxonomic feature. *Trichomma*, *Atrometus* and *Clatha* are exceptional in having this face centrally swollen and bearing many elongate spines on the proximal side of the swelling (Text-figs 34, 65, 71). *Anomalon* differs from the other genera in having the clasping face weakly distally swollen and bearing spines over the rather extensive proximal slope (Text-fig. 67). All other genera examined were found to have a ridge extending more or less diagonally across the face of the distivolsella. The extent to which this ridge is developed varies from genus to genus. It is most developed in the genera *Therion*, *Heteropelma* and *Habronyx* and least well developed in the genera *Pseudanomalon*, *Barylypa* and *Philodrymus* (Text-figs 64–83).

The position of the spines is a useful diagnostic feature of certain genera. Both *Therion* and *Heteropelma* usually have the most proximal spines paired (Text-figs 69, 70). *Aphanistes* is distinct in having large regularly arranged conical spines (Text-fig. 73), whereas *Tanypelma* has the spines distributed on the ventral portion of the distivolsella (Text-fig. 75) and *Pseudanomalon* has a very few spines on the apico-ventral margin (Text-fig. 77).

The shape of the entire distivolsella is a useful feature of certain genera. *Aphanistes* has the distivolsella centrally a little angled and distally truncate, whilst *Vernamalon* has the distivolsella markedly acute apically. The distivolsellae of the genera *Parania* and *Gravenhorstia* are rather quadrate (Text-figs 74, 80) and differ from the other genera examined in having the distivolsella more than 0·8 times as broad basally as long.

In all Anomalonine genera examined the distivolsellar apodeme was found to be large and simple, like those of the Ophioninae, and quite unlike the bipartite apodeme found in some of the Metopiinae (Text-fig. 35).

All the Anomalonine genera examined were found to bear a number of obvious microtrichia along the margin of the volsella remote from the gonolacinia. It is suggested that these microtrichia are mechanoreceptors.

Of the parts of the male genitalia, the aedeagus is undoubtedly of the most interest to taxonomists. It is for many Anomalonine genera singularly characteristic in form. It may prove possible to separate males of hitherto much confused species by examination of the structure of this organ. Sědivy (1956) used a difference in the form of the aedeagus to distinguish between *Therion circumflexum* and *T. giganteum*.

The aedeagi of the Anomaloninae are much less elongate than the corresponding organs of either the Metopiinae or the Ophioninae although the aedeagus of *Ophionellus* superficially resembles those of the latter subfamily.

The aedeagus of *Anomalon* is terminally evenly rounded and possesses a sclerotized region which is produced into a proximally directed spine (Text-fig. 86) that is quite unlike any structure in the aedeagus of the other genera examined.

The Therionini exhibit a wide variety of form in the aedeagus. Generally the aedeagi are somewhat terminally lobate and characteristically with one or more membranous areas present. In the genera *Barylypa*, *Aphanistes*, *Habronyx* (*Habronyx*) and to a lesser extent *Heteropelma* and *Gravenhorstia*, the ventral membranous region is covered with minute spines (Text-figs 100–105). In other genera this region is smooth (Text-figs 132–139).

Trichomma is particularly unusual in having an extensively membranous aedeagus, which is noticeably reticulately sculptured and has a spinose area medio-apically (Text-figs 130, 131).

The shape of the extreme base of the parameres varies considerably within the Therionini. The majority of genera have the paramere base either acute or bluntly rounded (Text-figs 44, 47). In some genera the base is flattened and spatuliformly explanate (Text-figs 45, 46). This development is most extreme in the genus *Spolas* (Text-fig. 46). In *Vernamalon* the paramere base is flattened and shaped like a spearhead (Text-fig. 48) whilst among *Parania* species the base is hastate (Text-fig. 45). *Philodrymus* and *Podogaster* are distinctive in having the bases of the parameres markedly angled and bearing a large apodeme (Text-fig. 49).

A more detailed discussion of the variations of the form of the aedeagus both within and between genera is included in the following sections.

EVALUATION OF CHARACTERS OF THE GENERA OF THE ANOMALONINAE

The generic classification in this work broadly follows that of Townes (1971) who, in his notable series of monographs, brought together, redescribed and compared the Ichneumonid genera of the world, thus making further research into the relationships within any one group considerably easier.

As a result of investigation of genitalia and morphometric evaluation of certain features, some changes have been made in the system of classification. Certain genera have been broadened to include exceptional species, and some unplaced species have been placed in newly erected genera. In every case the author has avoided erecting new and possibly spurious genera for every atypical species examined. Only when a species or group of species has been found to differ in a considerable number of characters from those of any described genus, a new genus has been erected.

Throughout this work emphasis is placed on the investigation of large numbers of characters. This is because the Ichneumonidae in particular show a large number of combinations of variations of a fairly small number of features. In the past emphasis has often been placed on a single feature (for example the presence or absence of notauli) and the placing of species in a genus depended almost wholly on this feature. This single character may well be reliable for the fauna of a particular zoogeographic region, although in another region this same character may break down. Consequently, a species similar to the type-species of a certain genus and differing perhaps only in the so called 'diagnostic feature' of this genus, may easily be placed in a separate genus. This is particularly true if the 'diagnostic feature' is very apparent. For example, *Erigorgus* and *Gravenhorstia* are very similar genera but *Gravenhorstia* is unusual in having a compact gaster, and is thus easily recognizable. Because of this obvious difference, the two genera have been treated as being quite distinct even though more recent evidence is constantly revealing that there are intermediate species. A number of the 'diagnostic characters' which in past works have received considerable emphasis are discussed below.

The position of vein Cu_{1a} in the forewing has been considered an important feature. As early as 1849, Wesmael divided 'Anomalon' (that is the group containing the majority of Therionine species, and excluding only *Therion*, *Heteropelma* and *Trichomma*) into those having Cu_{1a} closer to $1m$–cu than to $1A$, and those having Cu_{1a} closer to $1A$ than to $1m$–cu. All authors since then have used this feature to facilitate generic separation. In the present work the position of this vein has been defined by the cubital index, CI. Chart 1 shows the ranges of CI for the larger genera. From this it can be seen that some genera consistently have CI greater than 1·00 (that is Cu_{1a} closer to $1A$; e.g. *Aphanistes*) and other genera consistently have CI less than 1·00 (that is Cu_{1a} closer to $1m$–cu; e.g. *Barylypa*). A few genera and subgenera have been found to be intermediate, having a value of CI distributed about 1·00. One of these, *Habronyx* (*Camposcopus*) was previously classed as having CI greater than 1·00, but it can clearly be seen that a number of specimens have CI less than 1·00. As this character is invariably found in keys after the separation of only the genera *Therion*, *Heteropelma* and *Trichomma*, there is a considerable chance that an inexperienced worker, failing to recognize the species immediately, would run the specimen down the wrong side of the key and place it within *Agrypon*.

Chart 2 shows the values of the discobrachial index DBI. This quantifies the position of the intersection of Cu_1 and $1m$–cu with relation to the central axis of the discosubmarginal cell. In most works, the genera *Therion* and *Heteropelma* have been separated from the remaining genera by describing them as having $Cu_1/1m$–cu at the centre of the discosubmarginal cell (i.e. DBI = 1·00) whilst other genera were described as having $Cu_1/1m\text{-}cu$ before the centre of the disco-submarginal cell (i.e. DBI less than 1·00). It can be seen that there is a definite range of overlap between *Habronyx* (*Habronyx*) and *Heteropelma*.

The presence of a transverse flexible suture immediately in front of the scuto-scutellar groove is a feature found only in the Ichneumonidae amongst a few Therionine genera (Podogastrini of Townes, 1971), and incompletely in the Xoridinae. This suture has also been found to be present in some species referable to genera which are placed in the Gravenhorstiini of Townes. As the presence or absence of this suture is the only proposed consistent difference between these two tribes, the occurrence of the suture in both groups makes the division into two separate tribes untenable.

In *Philodrymus*, *Ophionellus*, *Podogaster* and *Clatha* there is a broad shallow scuto-scutellar groove, which is continuous laterally with the axillae (Text-figs 188–191) and may represent a dorsal axillary bridge, a feature which has been observed in some Chalcidoidea (Grandi, 1920). A median longitudinal section through the thorax has shown that there is a discontinuity in the sclerotized exocuticle, and internally the margins of this discontinuity are rounded and separate (Text-fig. 191).

In *Ophiopterus* two secondary grooves are present immediately anterior to the suture. These grooves are impressed in the exocuticle and are not areas of exocuticular invagination (Text-figs 184, 185). In this genus the scuto-scutellar groove is deeper and narrower than in those of the aforementioned genera. The scuto-scutellar morphology of *Ophiopterus* is similar to that of *Phaenolabrorychus*. In the latter genus, however, three transverse grooves only are present, the most posterior of these being in a similar position to the suture in *Ophiopterus*. In section, the posterior groove was found to be the deepest, but did not penetrate the exocuticle, and was observed to be continuous with the lateral scuto-axillary invagination (Text-figs 180, 181). Cuticular wedges of the type described by Sharplin (1963) found internally in areas where flexibility is required, have not been found to be present in the scuto-scutellar region of these insects.

In *Vernamalon* the scuto-scutellar groove is deep and the posterior part of the scutum is almost touching the anterior margin of the scutellum. A transverse suture is present, but it is infolded so that in section it is horizontal to the longitudinal axis of the insect (Text-figs 186, 187). Dorsally the suture is obscured by an overhanging margin of the scutum. In many insects it is difficult to see, except by dissection, whether or not a similarly placed suture is present. This is the case with many species at present placed within *Agrypon*. In some specimens in the BMNH collections (labelled *Trichionotus arquatum* (Gravenhorst)) and in an undescribed species of *Agrypon*, a continuous suture is present. These specimens otherwise resemble the majority of other species of *Agrypon* in having the fore coxae carinate. In *A. albiditarsum* a suture is also present, although it is interrupted laterally by a short area of fusion between the scutum and the axillae (Text-fig. 182). In the majority of species in this genus there has not been found to be any trace of a suture present, except at the extreme lateral margins of the scutum (Text-fig. 178).

Discussion of some remaining characters is included where relevant in the generic diagnoses.

KEYS TO GENERA AND SUBGENERA

The adult Anomaloninae

1 Epipleuron of tergite 3 separated by a longitudinal crease below the spiracle; mid tibia with a single spur; 2 + *3rm* distal to *2m–cu* or absent; posterior ocellus closer to anterior ocellus than to an often incomplete occipital carina; ♀ with valvula 3 longer than tergite 2; ♂ with gonolacinia weakly curved, without teeth (Text-fig. 50); parasites of coleopterous larvae . . . 2

– Epipleuron of tergite 3 not separated by a longitudinal crease (Text-fig. 226); mid tibia with 2, or rarely with a single apical spur; 2 + *3rm* usually proximal to, rarely opposite or distal to *2m–cu*; posterior ocellus usually closer to occipital carina than to anterior ocellus (Text-fig. 175); ♀ often with valvula 3 shorter than length of tergite 2; ♂ with gonolacinia moderately to strongly curved, usually with obvious apical teeth present; parasites of lepidopterous larvae 3

2 (1) Length of 2 + *3rm* approximately equal to that of abscissa of *M* between 2 + *3rm* and *2m–cu*; hindwing with abscissa of *Rs* between R_1 and *1m–cu* greater than 0·9 times as long as *1m–cu*; flagellum of ♀ never with a white band. (Cosmopolitan) . . . . . **ANOMALON** Panzer (p. 85)

– Length of 2 + *3rm* less than 0·3 times as long as abscissa of *M* between 2 + *3rm* and *2m–cu*; hindwing with abscissa of *Rs* between R_1 and *1m–cu* less than 0·5 times as long as *1m–cu*; flagellum of ♀ often with a white band. (Neotropical and southern Nearctic) . . . **NEOGREENIA** Viereck (p. 88)

3 (1) Mid tibia with two distinct apical spurs 4

– Mid tibia with a single apical spur 41

4 (3) Forewing with 2 + *3rm* angled near base and distal to *2m–cu* (Text-fig. 197); scape strongly oblique apically, especially in the ♀ (Text-fig. 172) so that shorter side is less than 0·5 times as long as longer side.

Apex of clypeus with a pair of median apical teeth; flagellum of ♀ usually with a white band. (Neotropical and southern Nearctic) **OPHIOPTERUS** Brullé (p. 84)

– Forewing with 2 + *3rm* straight; scape apically truncate or weakly oblique but always with shorter side more than 0·5 times as long as longer side . . 5

5 (4) Hindwing with distal abscissa of Cu_1 present, at least proximally, rarely with this vein weakly pigmented 6

– Hindwing without any trace of distal abscissa of Cu_1; Cu_1 + *cua* evenly curved or straight, without basal stub of distal abscissa of Cu_1 26

6 (5) Forewing with Cu_1 between *cua* and *1m–cu* 0·8 or more (usually 0·86 or more) times as long as *1m–cu* (Text-fig. 196); lower anterior margin of pronotum usually with a distinct tooth (Text-fig. 205); clypeus without a median apical tooth 7

– Forewing usually with Cu_1 between *cua* and *1m–cu* 0·75 or less times as long as *1m–cu* (Text-fig. 1); rarely, if more than 0·75, then clypeus with a median apical tooth and lower anterior margin of pronotum without a tooth . . 9

7 (6) Posterior transverse carina of mesosternum interrupted before each mid coxa; lower face at narrowest point at least 0·85 times as broad as height of lower face from medio-clypeal apex to antennal base; hind tarsal claws simply curved.

Lower face often yellow with black vertical stripes; ♂ with hind tarsi ventrally flattened, glabrous, often with a longitudinal carina. (All regions except Australian) . . . . ***THERION*** Curtis (p. 49)

– Posterior transverse carina of mesosternum complete; lower face at narrowest point at most as broad as height of lower face from medio-clypeal apex to antennal bases; hind tarsal claws apically turned through more than 90 (except in one Australian species) (Text-fig. 221) 8

8 (7) Scutellum in profile very convex; nervellar index more than 0·80; second hind tarsal segment of ♂ without a flattened impressed area. (Nearctic) ***TANYPELMA*** Townes (p. 52)

– Scutellum in profile flattened; nervellar index less than 0·60; second hind tarsal segment of ♂ with a flattened impressed area bearing broad hairs (Text-fig. 177) (except in *H. elongatum*). (Palaearctic and Indo-Australian regions) . . . . . . ***HETEROPELMA*** Wesmael (p. 51)

9 (6) Apex of clypeus concave or truncate, without a median apical tooth (Text-fig. 159); mesoscutum in profile smoothly and evenly rounded, notauli absent. (Palaearctic and Mediterranean) 10

– Apex of clypeus convex or pointed, usually with a median apical tooth, if rarely this tooth is absent then either mesoscutum in profile is abruptly rounded, or notauli are present, if very rarely clypeus is truncate or weakly concave then median apical tooth is distinct (Text-figs 160–163) . . 11

10 (9) Epipleuron of second gastral segment not separated by a crease; tergite 2 laterally only slightly longer than deep apically; occipital carina complete; forewing with 2 + 3*rm* opposite or slightly proximal to 2*m–cu*.

Large yellow and black insects. (North Africa) ***AUBERTIANA*** Viktorov (p. 61)

– Epipleuron of second gastral tergite separated by a crease; tergite 2 laterally more than 2·0 times as long as deep apically; occipital carina absent dorsally; forewing with 2 + 3*rm* distal to 2*m–cu*.

Medium sized, reddish brown and black insects. (Turkey and southern U.S.S.R.) . . . . . . ***ATROMETOIDES*** Fahringer (p. 62)

11 (9) Eyes with dense elongate pubescence; lower face at narrowest point less than 0·55 times as broad as distance from medio-clypeal apex to antennal base (Text-fig. 158); hind wing with radial index less than 1·20; ♀ with valvula 3 as long as tergite 2; ♂ with distivolsella with central hump bearing elongate spines (Text-fig. 65).

Often parasitic on fruit-mining or other concealed lepidopterous larvae. (Cosmopolitan) . . . . ***TRICHOMMA*** Wesmael (in part) (p. 63)

– Eyes at most shortly and sparsely pubescent; lower face at narrowest point more than 0·65 times as broad as distance from medio-clypeal apex to antennal base; hind wing with radial index often more than 1·35; ♀ with valvula 3 less than 0·65 times as long as tergite 2 (except in some Nearctic species); ♂ with distivolsella with short spines arranged diagonally, transversely or peripherally 12

12 (11) Basal segments of the gaster elongate; tergite 2 more than 1·45 times as long as tergite 3, and more than 2·8 times as long as deep apically (when measured laterally); tergite 3 laterally, longer than deep 13

– Basal segments of gaster not elongate; tergite 2 less than 1·35 times as long as tergite 3, and 2·5 times as long as deep apically (when measured laterally); tergite 3 laterally, almost quadrate (Text-fig. 226) 23

13 (12) Fore coxae, when viewed ventrally, with a carina discernible along their anterior edge.

Forewing with cubital index less than 0·6. (Cosmopolitan) ***AGRYPON*** Foerster (in part) (p. 66)

– Fore coxae, when viewed ventrally, smooth without a trace of carina along anterior edge 14

14 (13) Posterior transcarina of the mesosternum complete; forewing with 2 + 3*rm* distal to 2*m–cu*.
Ocelli large, posterior ones separated from occipital carina by less than 0·3 times their diameter; hind tarsal claws pectinate to apices. (Old World tropics) . . . . . . ***PSEUDANOMALON*** Szépligeti (p. 48)

– Posterior transverse carina of the mesosternum interrupted in front of each mid coxa, or vestigial; forewing usually with 2 + 3*rm* proximal to 2*m–cu*, rarely opposite or distal 15

15 (14) Pronotum dorsally flat, without any trace of a transverse groove, or if rarely with a very indistinct groove, then occipital carina absent centrally or laterally; forewing with cubital index less than 0·65, generally less than 0·45 . 16

– Pronotum dorsally with a distinct transverse groove, in a few Australian species with the groove weakly impressed, but then always with the occipital carina complete; forewing with cubital index greater than, 0·75, usually greater than 0·95 17

16 (15) Occipital carina usually entirely absent on upper 0·5 of head, laterally strongly raised, rarely with central part of occipital carina present and upper lateral part absent; aedeagus with raised vertical keels immediately before the apex (Text-fig. 85); epomia usually strongly divergent from anterior margin of pronotum. (Central American and Nearctic) . ***CORSONCUS*** Townes (p. 46)

– Occipital carina complete; aedeagus without keels, heavily and rather evenly sclerotized; epomia weakly divergent from anterior margin of pronotum. (Cosmopolitan) . . . . ***BARYLYPA*** Foerster (p. 44)

17 (15) First segment of hind tarsus prolonged on its upper side beyond the insertion of the second segment; mandible often with a single tooth. (North Africa and U.S.S.R.) . . . . . . ***PORIZONOPTERON*** Shestakov (p. 63)

– First segment of hind tarsus not prolonged on upper side beyond the insertion of the second segment; mandible with two teeth except in a few Australian and Neotropical species 18

18 (17) Lower anterior corner of pronotum produced into a small rather weakly sclerotized tooth (Text-fig. 201); postscutellum much longer than broad (Text-fig. 230); propodeum when viewed dorsally more than 2·5 times as long as broad centrally, anteriorly parallel sided.
Hind trochanter and trochantellus subequal in length; scutellum usually yellow. (Western Palaearctic)
HABRONYX subgenus ***HABROCAMPULUM*** subgen. n. (p. 38)

– Lower anterior corner of pronotum without a tooth; postscutellum broader than long (in a few Australian species quadrate); propodeum less than 2·0 times as long as broad centrally 19

19 (18) Mesoscutum in profile with an angular concavity just before anterior margin, so that extreme front margin is horizontal (Text-fig. 208); tarsal claws pectinate to apices (Text-fig. 212); frons usually with a median vertical lamella.
Ocelli often very large, posterior ones separated from occipital carina by less than 0·3 times their diameter. (Cosmopolitan)
APHANISTES Foerster (p. 41)

– Mesoscutum in profile without a concavity before anterior margin, or rarely in a few Australian species, when weak anterior concavity is present, then tarsal claws are not pectinate to apices and the frons is without a median vertical lamella 20

20 (19) Mesoscutum in profile anteriorly evenly rounded (Text-fig. 209); notauli entirely absent, not even represented by an area of coarser sculpture.
Lower corner of pronotum simply acute (Text-fig. 204); claws of ♂ long, weakly curved, pectinate only at extreme base (Text-figs 215–218), those of ♀

shorter, moderately curved, pectinate to, or just beyond, the centre; ♂ with apex of aedeagus with a dorsal lobe. (Cosmopolitan)

GRAVENHORSTIA subgenus ***ERIGORGUS*** Foerster (p. 60)

– Mesoscutum in profile weakly to strongly abruptly rounded (Text-fig. 206); notauli present, strongly impressed, rarely quite weakly impressed but then discernible by being strongly rugose 21

21 (20) Forewing with marginal index greater than 1·50, usually more than 1·80; epicnemial carina extending above centre of mesopleuron, its upper end reaching the anterior margin of the pleuron; hindwing with nervellar index greater than 3·5.

Tarsal claws short, not reaching beyond apex of arolium, pectinate except apically; small species (15 mm or less). (Holarctic)

HABRONYX subgenus ***CAMPOSCOPUS*** Foerster (p. 37)

– Forewing with marginal index less than 1·50, usually less than 1·40; epicnemial carina usually not extending above the centre of the mesopleuron except in a few large (30 mm +) species; hindwing with nervellar index less than 2·5, usually very much less 22

22 (21) Trochanter more than 1·5, usually more than 1·6 times as long as trochantellus when viewed ventrally; clypeus invariably with median apical tooth; ♂ with aedeagus with a well developed dorsal membranous area that resembles a crest in dried specimens; distivolsella slender, apically swollen; large to very large insects (30 mm +); sometimes with the tarsal claws pectinate nearly to apices. (Cosmopolitan)

HABRONYX subgenus ***HABRONYX*** Foerster (p. 36)

– Trochanter at the most 1·45, usually less than 1·4 times as long as trochantellus when viewed ventrally; clypeus varying from medially pointed with a small apical tooth to simply convex, without a tooth; ♂ with aedeagus with a poorly developed dorsal membranous area that does not appear crest-like in dried specimens; distivolsella moderately broad, not at all swollen at apex; moderate sized insects (15–20 mm); tarsal claws sexually dimorphic, those of ♂ long, weakly curved and pectinate at extreme base, those of ♀ shorter, more strongly curved and pectinate to centre (Text-figs 213, 214). (Australian)

HABRONYX subgenus ***AUSTRANOMALON*** subgen. n. (p. 39)

23 (12) Hind tarsal claws with a median 90° bend; vertex with posterior ocelli separated from the occipital carina by at least twice their diameter; occipital carina often centrally interrupted; abdomen weakly depressed.

Large, pale to dark coloured insects; wings often with dark patterning. (Southern Africa) . . . . . ***ENCARDIA*** Tosquinet (p. 53)

– Hind tarsal claws medianly curved, not at all geniculate (Text-fig. 211); vertex with posterior ocelli separated from the occipital carina by less than 1·5 times their diameter; occipital carina complete 24

24 (23) Tergite 2 laterally about 1·6 times as long as deep apically, its epipleuron wide and conspicuous; lower face with a large median tubercle immediately below the antennae; lower tooth of mandible almost equal in length to the upper.

Large black and yellow insects. (Mediterranean)

GRAVENHORSTIA subgenus ***GRAVENHORSTIA*** Boie (p. 58)

– Tergite 2 laterally at least 2·0 times as long as deep apically, its epipleuron narrow; lower face planar, with at the most a minute median tubercle below base of antennae; lower mandibular tooth distinctly the shorter . . 25

25 (24) Mandible with a large ventrobasal lobe (Text-fig. 164); eyes glabrous; tarsal claws pectinate for most of their length; apex of clypeus angular with an obtuse point (Text-fig. 157); face coarsely punctate.

Abdomen immaculately red. (Spain)

GRAVENHORSTIA subgenus ***RIBASIA*** Ceballos (p. 61)

– Mandible without a large basal lobe; tarsal claws at most pectinate only basally; apex of clypeus margined, with a very small median tooth; face finely punctate.

Yellow and black banded insects. (Mediterranean and central Asia)
GRAVENHORSTIA subgenus ***KOKUJEWIELLA*** Shestakov (p. 59)

26 (5) Fore coxae, when viewed ventrally, with a carina discernible along their anterior edge, rarely with carina very weak (Text-fig. 224) 27

– Fore coxae, when viewed ventrally, smooth without a trace of a carina along anterior edge (intermediate specimens will key through either couplet) . 29

27 (26) Pedicel as long as, or longer than, scape (Text-fig. 171); mesoscutum with transverse furrows before scuto-scutellar groove (Text-fig. 180); posterior apex of propodeum produced into an elongate unsculptured 'neck'.

Apex of clypeus with a pair of small teeth. (Neotropical)
PHAENOLABRORYCHUS Viereck (p. 69)

– Pedicel at most 0·8 times the length of scape, generally less than 0·6 times; mesoscutum without transverse furrows, at most with indistinct wrinkling before scuto-scutellar groove; posterior apex of propodeum either not produced into an elongate neck, or rarely, if produced into a neck, then the neck is coarsely reticulately sculptured 28

28 (27) Carina on fore coxae almost entirely encircling the coxa, present on outer side above the trochanteral socket as well as on anterior and inner sides; clypeal apex with a small median and two minute lateral teeth, the lateral teeth sometimes indistinct, rarely with all teeth indistinct, the clypeus therefore appearing simply convex apically. (Indo-Papuan and Australian regions)
PERISPHINCTER Townes (p. 68)

– Carina on fore coxae on anterior and often inner sides, never on outer side above the trochanteral socket (Text-fig. 224); apex of clypeus usually with a strong median tooth, rarely convex with a small median tooth. (Cosmopolitan)
AGRYPON Foerster (p. 66)

29 (26) Mesoscutum with a transverse suture anterior to the scuto-scutellar groove; posterior transverse carina of mesosternum complete 30

– Mesoscutum without a transverse suture; posterior transverse carina of mesosternum complete or interrupted before mid coxae 36

30 (29) Forewing with *1m–cu* and Cu_{1a} basally separated by a distance at least 0·25 times the length of Cu_{1b}.

Apex of propodeum extended into a long neck, the neck not sculptured (Text-fig. 227); forewing often with distal margins clouded. (Ethiopian region) . . . . ***CECHENODES*** Townes (p. 76)

– Forewing with Cu_{1a} and *1m–cu* basally united, or separated by at most a distance equal to less than 0·1 times the length of Cu_{1b} 31

31 (30) Sternaulus present as a foveolate impression that extends 0·3–0·6 times the length of mesopleuron; lower distal corner of first subdiscal cell separated from a very weakly impressed vannal notch by a distance equal to about 0·9 times length of *cua*, and with a pigmented region resembling a vein that extends from lower distal corner of first subdiscal cell to hind margin of wing (Text-fig. 195); hindwing with 3–5 hamuli on R_1 32

– Sternaulus absent or indistinct, not strongly impressed; lower distal corner of first subdiscal cell close to vannal notch, never separated by more than 0·5 times length of *cua*, and if rarely with a pigmented region resembling a vein present, then this is parallel to posterior margin of wing (Text-fig. 192); hindwing usually with 6 or more hamuli on vein R_1 33

32 (31) Apex of propodeum extended into a neck that reaches to or beyond apex of hind coxa; inner margins of eyes very strongly convergent ventrally, at their closest point separated by a distance about equal to width of base of man-

dible; hindwing with radial index less than 1·2; petiolar spiracles very close to hind margin of tergite. (Neotropical region) ***PODOGASTER*** Brullé (p. 80)

– Apex of propodeum not extended into a neck, not reaching beyond centre of hind coxa; inner margins of eyes moderately convergent ventrally, at their closest point separated by a distance equal to at least twice the width of the mandible base; hindwing with radial index more than 1·5; petiolar spiracles not unusually close to posterior margin of tergite. (Neotropical region) ***PHILODRYMUS*** Townes (p. 81)

33 (31) Occipital carina separated from posterior ocelli by more than 3·0 times the diameter of an ocellus; clypeus with a pair of apical teeth (Text-fig. 233).
Notauli represented by coriaceous areas which in posterior half of mesoscutum are produced into a raised ridge. (Ethiopian region) ***VERNAMALON*** gen. n. (p. 77)

– Occipital carina at most separated from posterior ocelli by a distance equal to 1·5 times the diameter of an ocellus; clypeus with a single median tooth . 34

34 (33) Inner margins of eyes very weakly convergent so that lower face appears almost square, the eyes separated by at least a distance of 0·8 times the length of face from antennal base to clypeal apex (Text-fig. 234); epicnemial carina medio-ventrally raised into a weak flange, but this flange does not extend anteriorly between fore coxae; genal carina reaching base of mandible separated from hypostomal carina (sometimes there is an auxillary carina present which crosses hypostomal carina); hindwing with *Rs* and *M* distinct almost to wing margin.
Flagellum usually very elongate, obviously longer than remainder of insect. (Ethiopian region) . . . . ***BIMENTUM*** Townes (p. 77)

– Inner margins of eyes moderately convergent ventrally so that lower face is distinctly longer than broad, the eyes separated by, at the most, a distance of 0·72 times the length of face from antennal base to clypeal margin; epicnemial carina medio-ventrally raised into a tooth-like projection which extends anteriorly between the bases of the fore coxae (Text-fig. 222); genal carina either joining hypostomal carina, or reaching base of mandible contiguous with hypostomal carina; hindwing with *Rs* and *M* not pigmented to wing margins 35

35 (34) Forewing with intercubital index greater than 1·0; marginal index less than 2·2; hindwing with radial index greater than 0·8; hind tarsi of ♂ strongly swollen. (Mediterranean region) . . . . ***ATROMETUS*** Foerster (p. 75)

– Forewing with intercubital index less than 0·70; marginal index greater than 2·5; hindwing with radial index less than 0·7; hind tarsi of ♂ not swollen.
Usually yellow species with black markings. (Oriental region) ***CLATHA*** Cameron (p. 74)

36 (29) Occipital carina separated from posterior ocelli by at least 3·0 times the diameter of an ocellus; apex of clypeus with a pair of teeth or weak tubercles medianly. (Nearctic region) . . . . ***METOA*** Townes (p. 73)

– Occipital carina close to posterior ocelli, at most separated by about 1·5 times the diameter of an ocellus; apex of clypeus with a single median apical tooth 37

37 (36) Eye surface bearing long hairs, the hairs being longer than the distance separating them basally; fore tibial spur usually with less than 12 widely spaced subacuminate macrotrichia on inner face.
♀ with valvula 3 as long as or longer than tergite 2; ♂ with distivolsella with a central hump bearing elongate spines. (Cosmopolitan) ***TRICHOMMA*** Wesmael (p. 63)

– Eye surface glabrous or if rarely with hairs then the hairs are short, basally separated by more than thrice their length; fore tibial spur with numerous closely packed acute macrotrichia on inner face 38

38 (37) Flagellar segments 1–5 very elongate, segment 4 about 7·0 times as long as broad; hindwing with radial index less than 0·4; posterior corner of pronotum with weak to strong longitudinal flanges (Text-fig. 203); posterior transverse carina of mesosternum present only laterally as vestiges.

♂ with distivolsella bearing long spines centrally positioned (Oceanic region) . . . . ***SPOLAS*** Townes (p. 72)

– Flagellar segments 1–5 not unusually elongate, segment 4 at very most 5·0 times as long as broad; hindwing with radial index more than 0·5; posterior corner of pronotum without flanges 39

39 (38) Forewing with *1m–cu* and Cu_{1a} basally united into a distinct short common stalk, or arising from same point on Cu_1; ♀ with ovipositor hastate, without a subapical dorsal notch; ♂ with aedeagus laterally slender, and in dried specimens, acutely pointed. (All regions except Australian) . ***PARANIA*** Morley (p. 70)

– Forewing with *1m–cu* and Cu_{1a} basally separated by a short to moderately long abscissa of Cu_1; ♀ with ovipositor with a more or less distinct subapical dorsal notch; ♂ with aedeagus apically truncate or bluntly rounded . . . 40

40 (39) Forewing with cubital index 0·75 or greater; posterior transverse carina of mesosternum interrupted in front of each mid coxa.

♂ with aedeagus obliquely truncate. (Holarctic)

HABRONYX subgenus ***CAMPOSCOPUS*** Foerster (in part) (p. 37)

– Forewing with cubital index 0·60 or less, usually very much less; posterior transverse carina of mesosternum usually complete. (Cosmopolitan)

AGRYPON Foerster (few species) (p. 66)

41 (3) Wings with venation very reduced; forewing with *2m–cu* absent (Text-fig. 200); gaster very elongate; thorax clothed with dense whitish pubescence.

Gonosquamae of ♂ elongate (Text-fig. 93). (Neotropical region)

OPHIONELLUS Westwood (p. 82)

– Wings without reduced venation, except possibly in the distal veins of the hindwing; forewing with *2m–cu* present; gaster not unusually elongate; thorax with scattered inconspicuous pubescence 42

42 (41) Hindwing with distal abscissa of Cu_1 totally absent; forewing with *1m–cu* and Cu_{1a} basally united into a short common stalk; hind tibial spurs inserted before apex of tibia. (Nearctic region) . . ***CALCANEUM*** Townes (p. 74)

– Hindwing with distal abscissa of Cu_1 present; forewing with *1m–cu* and Cu_{1a} basally separated by an abscissa of Cu_1; hind tibial spurs inserted at apex of tibia 43

43 (42) Lower anterior margin of pronotum with a large tooth (Text-fig. 205); hind tarsal claws sharply angled more than 100° (Text-fig. 221) 44

– Lower anterior margin of pronotum without a tooth; hind tarsal claws curved weakly to moderately (Text-fig. 215) 45

44 (43) Mesoscutum with a transverse suture before the scuto-scutellar groove; forewing with 2 + *3rm* widely separated from *2m–cu* (Text-figs 198, 199); hindwing with 7 widely spaced hamuli on R_1.

Propodeum globosely swollen; fore coxae with a transverse carina on ventral surface. (Eastern Palaearctic) . ***BRACHYNERVUS*** Uchida (p. 78)

– Mesoscutum without a transverse suture before the scuto-scutellar groove; forewing with 2 + *3rm* proximal to *2m–cu* by about its own length; hindwing with about 12 closely interspaced hamuli on R_1.

Head behind the eyes abruptly narrowed (Text-fig. 176). (Malaysian)

Heteropelma perornatum Cameron (p. 52)

(This species sometimes has the inner tibial spur very reduced and although it appears to have a single spur on mid tibia, two are in fact present.)

45 (43) Clypeus elaborately sculptured (Text-fig. 167); mandible bidentate; tarsal

claws small, basally pectinate; occipital carina centrally interrupted by a series of discontinuities. (Turkey) . ***CLYPEOCAMPULUM*** gen. n. (p. 42)
– Clypeus smooth; mandible unidentate; tarsal claws long, weakly curved, not pectinate; occipital carina complete. (Western Nearctic) ***LIOPTERNA*** Townes (p. 48)

The described final instar larvae of Anomaloninae

The characters used in this key were found to work for the material available. However, one genus, *Agrypon*, was found to contain species with widely differing larval morphology. Whether this is because *Agrypon* contains a number of species which are not as closely interrelated as their adult morphology has led workers to believe, or because the characters used for the larva are not constant within a genus is not clear. Only by examination of a large amount of larval material can this problem be solved. It is apparent, however, that the massive sclerotization of the epistoma and pleurostoma, which has been used for dividing the Therionini into two tribes, occurs in species belonging to both these groups and cannot therefore be used as a tribal character. As this massive sclerotization has only been observed in larger Therionini (*Heteropelma*, *Therion*, *Habronyx* (*Habronyx*) and *Encardia*) it is possible that the size of the insect is important in determining the relative degree of sclerotization of the epistoma etc.

1 Blade of mandible with teeth (Text-fig. 141); setae present on prelabium ***ANOMALON***
– Blade of mandible without teeth; prelabium without setae 2
2 (1) Distal end of stipital sclerite bifid; hypostoma short, about 1·3 times as long as basal width of mandibles . . . . ***TRICHOMMA***
– Distal end of stipital sclerite not bifid; hypostoma short to very long . . 3
3 (2) Labral sensillae arranged in two clusters on separated sclerotized regions (Text-figs 142, 143, 146). 4
– Labral sensillae arranged in a single group (Text-figs 144, 147) or if with tendency to form two clusters (as in *Barylypa*) then clusters united on a single sclerotized region 8
4 (3) Proximal 0·5 of hypostoma slender, less broad than width of mandible base, parallel-sided throughout most of its length (Text-fig. 151); pleurostoma slender, at very most as broad as basal width of mandible 5
– Proximal 0·5 of hypostoma broader than width of mandible base, strongly tapered for most of its length (Text-fig. 143); pleurostoma broader than basal width of mandible 6
5 (4) Mandibles with blade arising from ventral surface; epistomal arch and pleurostomae very arched so that distance between posterior pleurostomal processes is about equal to distance from median point of a line joining the posterior pleurostomal processes to centre of epistomal arch (Short, 1959 : fig. 62A) ***ATROMETUS***
– Mandibles with blade arising from centre; epistomal arch and pleurostomae moderately arched so that distance between posterior pleurostomal processes is very much less than distance from median point of a line joining the posterior pleurostomal processes to centre of epistomal arch (Text-fig. 151) ***AGRYPON*** (in part)
6 (4) Head sclerites, when viewed flattened on a slide, with distal end of hypostoma

curved and reaching below level of lower margin of silk press; hypostoma longer than 2·5 times basal width of mandible; mandibles with blades arising from centre (Text-fig. 146) . . . . ***PERISPHINCTER***

– Head sclerites, when viewed flattened on a slide, with distal end of hypostoma not curved or moderately curved so that distal ends do not extend below the level of the silk press; hypostoma shorter than 2·0 times basal width of mandible; mandibles with blades arising from ventral surface 7

7 (6) Ventral part of labial sclerite lightly sclerotized so that labial sclerite appears continuous (Text-fig. 142); hypostoma with distal end curved downwards ***HETEROPELMA***

– Ventral part of labial sclerite not sclerotized so labial sclerite appears to be separated into a pair of lateral parts (Text-fig. 143); hypostoma with distal end not at all curved . . . . ***THERION***

8 (3) Width of epistoma along entire length and width of pleurostoma along entire length equal to or greater than width of base of mandible; hypostoma shorter than length of mandible from apex of blade to base; hypostomal spur absent entirely; upper ends of labial sclerite broadened (Text-fig. 155) . ***ENCARDIA***

– Width of epistoma in part or width of pleurostoma, in part, less than width of mandible base or with hypostoma longer than 1·5 times length of mandible; hypostomal spur absent or present; upper ends of labial sclerite not obviously broadened 9

9 (8) Silk press with pigmented region crescent-shaped (Text-fig. 148); labral sensillae arranged on a region that has centre and lateral extremities swollen; epistomal arch dorsally raised into a central hump ***HABRONYX (AUSTRANOMALON)***

– Silk press with pigmented region simply U-shaped; labral sensillae arranged on a region that is transversely parallel sided; epistomal arch various . . 10

10 (9) Hypostomal spur present as a small process close to base of posterior pleurostomal process (Text-figs 144, 147) 11

– Hypostomal spur entirely absent 12

11 (10) Hypostoma and pleurostoma very broad, sickle-shaped (Text-fig. 144); distal end of hypostoma acutely pointed . . ***HABRONYX (HABRONYX)***

– Hypostoma and pleurostoma of moderate breadth, almost straight (Text-fig. 147); hypostoma with distal end truncate ***GRAVENHORSTIA (ERIGORGUS)***

12 (10) Hypostoma at extreme proximal end less than 0·7 times as broad as basal width of mandible; pleurostoma at narrowest point less than 0·5 times as broad as basal width of mandible 13

– Hypostoma at extreme proximal end more than 0·9 times as broad as basal width of mandible; pleurostoma at narrowest point more than 0·5 times as broad as basal width of mandible 14

13 (12) Blade of mandible arising from ventral surface of mandible base; hypostoma weakly curved about 40° (Text-fig. 140) . ***HABRONYX (CAMPOSCOPUS)***

– Blade of mandible arising from middle of base; hypostoma evenly but strongly curved through about 80° (Short, 1959 : fig. 62B) . . ***AGRYPON*** (in part)

14 (12) Head sclerites, when viewed mounted flat, with hypostoma weakly curved about 50° so that distal end of hypostoma does not extend below the level of the silk press (Short, 1959 : fig. 61B) . . . . . ***BARYLYPA***

– Head sclerites, when viewed mounted flat, with hypostoma strongly angled about 90° or more and with distal end of hypostoma extending below the level of the silk press 15

15 (14) Epistomal arch centrally acutely angled (Text-fig. 149) . . ***PARANIA***

– Epistomal arch evenly convex 16

16 (15) Width of epistomal arch medianly about equal to the width of the mandible base (Text-fig. 150) . . . . ***APHANISTES***

– Width of epistomal arch medianly less than 0·8 times the width of mandible base . . . . ***AGRYPON*** (in part)

Tribe **THERIONINI** Viereck

[Anomaloidae Foerster, 1868 : 140. Type-genus: *Anomalon* Panzer. Based on Gravenhorst's (1829 : 641) misinterpretation of *Anomalon* Panzer.]
[Anomalina Foerster; Thomson, 1887 : 1048.]
[Anomalonini Ashmead, 1894 : 277.]
[Anomalinae Foerster; Dalla Torre, 1901 : 155.]
Pharsaliinae Szépligeti, 1905*a* : 3. Type-genus: *Pharsalia* Cresson (= *Ophionellus* Westwood).
Pharsaliini Szépligeti; Schmiedeknecht, 1908 : 1409.
[Anomalides Foerster; Morley, 1913*a* : 49.]
Hymenopharsalina Viereck, 1918 : 72. Type-genus: *Hymenopharsalia* Morley (= *Ophionellus* Westwood).
Therioninae Viereck, 1918 : 72. Type-genus: *Therion* Curtis.
Ophionellini Cushman, 1922 : 16. Type-genus: *Ophionellus* Westwood.
Ophionellina Cushman; Townes, 1945 : 710.
Ophiopterina Townes, 1945 : 711. Type-genus: *Ophiopterus* Brullé.
Aphanistina Townes, 1945 : 711. Type-genus: *Aphanistes* Foerster.
Therionina Viereck; Townes, 1945 : 723.
Therionini Viereck; Hellén, 1950 : 31.
Gravenhorstina Hellén, 1950 : 31. Type-genus: *Gravenhorstia* Boie. **Syn. n.**
Trichommina Hellén, 1950 : 31. Type-genus: *Trichomma* Wesmael.
Gravenhorstiina Townes, 1951 : 396.
Gravenhorstiini Townes; Short, 1959 : 502.
Erigorgina Viktorov, 1968 : 554. Type-genus: *Erigorgus* Foerster.
Podogastrini Townes, 1971 : 148. Type-genus: *Podogaster* Brullé. **Syn. n.**
Theriini Townes, 1971 : 155.

For the diagnostic characters of the tribe see Table 3 (p. 93).

Strict application of the Law of Priority would favour Pharsaliini as the name of this tribe, but I have followed other recent authors (Perkins, 1959; Viktorov, 1968) in preferring the name Therionini because of its much wider use. This spelling, rather than the recently corrected form, Theriini, is used in accordance with Article 29(d) of the *International Code of Zoological Nomenclature*.

Genus ***HABRONYX*** Foerster

Habronyx Foerster, 1868 : 145.

Eye without, or rarely with, short scattered pubescence; inner margins of eyes weakly to moderately convergent ventrally; occipital carina complete, usually closer to the posterior ocelli than the diameter of an ocellus, except in some Oriental species; frons with or without a median vertical carina (in one Australian species with a median vertical lamella present). Antennae moderately long, those of ♀ without a white band; scape truncate, about 2·0 times as long as pedicel; fourth flagellar segment about 2·0 times as long as broad. Clypeus with, or rarely without, a median apical tooth; mandibles bidentate, apex not twisted, upper tooth distinctly the longer; labial palp with four or very rarely three segments; cardo basally lobed. Genal carina reaching base of mandible.

Pronotum dorsally long, subhorizontal, with a transverse groove; lower anterior margin of pronotum without a tooth (except in one Palaearctic species); lower anterior corner acute to truncate. Anterior of mesoscutum rather evenly to abruptly rounded in profile, without an apical concavity present (except in one Palaearctic species); notauli weakly to strongly impressed, extending beyond the centre of the mesoscutum in most species, and with medio-posterior region of mesoscutum rugosely sculptured; transverse suture of the mesoscutum absent, transverse furrows absent. Epicnemial carina various, medio-ventrally not raised into a flange; sternaulus indistinct or absent; posterior transverse carina of mesosternum interrupted in front of each mid coxa.

Fore coxa smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter various, between 0·8 and 1·9 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws various, from almost not to noticeably sexually dimorphic.

Forewing with *Rs* sinuate to straight; *2* + *3rm* distal, opposite or proximal to *2m–cu*; *1m–cu* and Cu_{1a} basally separated. Hindwing with 9–19 hamuli on R_1; distal abscissa of Cu_1 present, very rarely indistinct basally.

Propodeum reticulate; spiracle various, usually 1·4–2·4 times as long as broad; apex of propodeum reaching about 0·35 times the length of hind coxa. Gaster elongate.

♀ genitalia. Valvula 3 a little shorter than the apical abdominal depth or at most 0·6 times as long as tergite 2; apex of ovipositor constricted, the constricted part 4–6 times as long as the median thickness of ovipositor; extreme apex straight; ovipositor weakly to moderately laterally compressed.

♂ genitalia. Syntergites separated by a median dorsal longitudinal membranous area. There is considerable variation in the morphology of the male genitalia. This variation is more fully discussed below.

Recently *Habronyx* has been extended to include several previously distinct genera (Townes, 1971), but the inclusion of certain species is not accepted by all workers (Horstmann, 1972). A detailed study of the species has shown that there are four distinct species-groups, at least two of which are closely related.

The *Habronyx heros* species-group includes ten species originally placed in three separate genera, *Habronyx*, *Acanthostoma* and *Macrostemma*. There is considerable morphological variation within this group, but when all species are examined it is apparent that there is no real discontinuity within the ranges of variation, and consequently the inclusion of this group of species together is acceptable.

It has recently been possible to examine the cephalic capsule of the final instar larva of *Habronyx* sp. (*?pyretorus*) (the adult specimen is somewhat damaged so specific determination was not possible). The cephalic capsule was observed to be quite distinct from that of the *Habronyx nigricornis*-group in having a massive pleurostoma and hypostoma but a rather weakly sclerotized epistomal arch. A small but clearly discernible hypostomal spur was found to be present (Text-fig. 144). Previous authors (Short, 1959; Townes, 1969) have characterized the Anomaloninae by the complete lack of a hypostomal spur, but not only has a small hypostomal spur been found within some species referable to this genus but a vestigial hypostomal spur has been observed in some species of *Gravenhorstia*.

There is a marked variation in the form of the aedeagus between species within the *heros*-group. All species examined were found to have the aedeagus with a fairly heavily sclerotized dorsal region with a well developed anterio-dorsal membrane bearing a few weak spines. A ventral membranous area covered with spines was also observed to be present. The extent of the anterio-dorsal and ventral membranous areas were found to be characteristic of the species examined (*H. heros, H. insidiator, H. australasiae, H. pyretorus* and *H. orbitalis*). In *H. heros* the anterio-dorsal membrane does not extend on to the apical face of the aedeagus, and the ventral membranous area is large and reaches the aedeagal apex (Text-fig. 100). There is a reduction in the size of the ventral membranous area through the species *H. orbitalis, H. insidiator,* and this area is most reduced in *H. pyretorus* (Text-figs 102–104). In this latter species there is an extension of the aedeagus along the ventral margin of the anterio-dorsal membrane which extends medio-vertically across the aedeagal apex. *H. australasiae* was observed to be somewhat unusual in having the anterio-dorsal membrane produced into a hook-like prominence (Text-fig. 105). In no species was there found to be a lateral extension of the ventral membranous area.

It is possible to correlate the reduction in the size of the ventral membranous area of the aedeagus with other characters such as the shape of the tarsal claws (those of *H. heros* are abruptly curved and pectinate almost to the apices whilst those of *H. pyretorus* are long, weakly curved and pectinate only at the extreme bases) and the shape of the propodeum (that of *H. heros* is about 1·1 times as long as broad, whereas that of *H. pyretorus* is about 0·8 times as long as broad). This correlation of characters provides strong evidence about the interrelationships and possible lines of evolution that have occurred within this group.

A second species-group, the *nigricornis*-group, was previously accorded separate generic status. These species are distinct from the aforementioned species-group in a number of characters (Table 1). It is possible that certain differences, such as the form of vein *Rs* in the forewing, may be the result of differences in the sizes of the insects concerned (*heros*-group are large insects of 25 mm+, whereas the *nigricornis*-group are considerably smaller, less than 15 mm). In the *heros*-group the labial palps are composed of four distinct segments, but in some smaller specimens of the *nigricornis*-group the labial palps have only three distinct segments, the fourth is apparently fused with the apex of the third. Similar fusion of third and fourth palpar segments has been observed in other Therionine genera, notably *Agrypon*, where larger individuals have four distinct palpar segments, but small specimens of the same or a closely related species have only three palpar segments. Examination of a long series of specimens of varying size revealed that there is an increasing degree of fusion between the two apical segments of the labial palps as there is a decrease in the size of the individuals examined (Text-figs 243–245). It must be noted however that size need not necessarily be the only factor affecting palpar fusion, for in the genus *Encardia* there is considerable atrophication of the segments of both the labial and maxillary palps in large insects (Text-fig. 242).

Measurement of the cubital index in a group of specimens gave the results shown in Chart 1. It can be seen that there is almost no overlap between the two groups.

A study of the male genitalia revealed that the *nigricornis*-group is closely related to the *heros*-group. The distivolsellae of the two species-groups are relatively similar in being elongate and bearing a very distinct diagonal spinose ridge (Text-fig. 68). The aedeagi of the *nigricornis*-group have apico-dorsal membranes which do not extend on to the aedeagal apices, are less sclerotized and bear pairs of detached sclerites in the membranes (Text-fig. 101). The aedeagi have few spines and bear a number of apically impressed tubercles which appear to have a minute apical pore. The ventral membranous areas are without spines and are laterally extended into small flanges.

The nomenclature of the *nigricornis*-group is particularly confused. Recently, before being included within *Habronyx*, this group was accorded separate generic status as *Camposcopus* (Townes *et al.*, 1965).

A number of authorities have treated *Camposcopus*, *Labrorychus* and *Blaptocampus* as separate genera. *Anomalon nigricorne* is the type-species of both *Labrorychus* (as included by Brischke, 1881) and *Blaptocampus* (as designated by Viereck, 1914*a*). The former must therefore take precedence. However *Labrorychus* has been extended by later European authors (Schmiedeknecht, 1908; 1936; Morley, 1915; Hellén, 1950; Ceballos, 1963) to include species not congeneric with the type-species, and often the type-species was placed in *Blaptocampus* as a separate genus. These incorrectly placed species differ from *A. nigricornis* in having a distinct transcarina on the fore coxae and in having vein Cu_{1a} basally very close to 1*m–cu*. These species have subsequently more correctly been included within the genus *Trichionotus* by Townes *et al.* (1965).

The genus *Camposcopus*, type-species *C. aclerivorus* Rowher (included by Rowher, 1915) has been distinguished from the group containing *nigricornis* solely by the fact that the third maxillary palpar segment is swollen in the former species, but not in the latter. In personal communication, Dr Townes suggested that the shape of the maxillary palp might be a sexually dimorphic feature, being more slender in the female of the species.

Horstmann (1972) observed that there is a considerable degree of variation in the shape of the third maxillary palpar segment, and did not consider this feature warranted generic distinction.

Examination of a number of specimens of *A. nigricorne* has shown that although the majority of specimens have the third maxillary palpar segment quite elongate, about 3·0 times as long as broad, a few males differ solely in having this segment much stouter, between 2·1 and 2·4 times as long as broad. It is apparent therefore that *Labrorychus* and *Blaptocampus* must be included as synonyms of *Camposcopus*.

The species described as *Anomalon biguttatum* has in the past presented some difficulty as to where it should most suitably be placed. Older authors placed it within the genus *Erigorgus*. Schmiedeknecht considered this species was intermediate between *Erigorgus* and *Aphanistes*. Morley concurred with this opinion and subsequently included *Aphanistes* and *A. biguttatum* within *Erigorgus*. More recently Townes (1971) included this species within *Habronyx*.

An examination of the critical features indicated that *A. biguttatum* is distinct from other species-groups in having a unique combination of characters (Table 1).

The form of the male genitalia of *A. biguttatum* is quite distinct from that of other groups of *Habronyx* species. The gonolacinia is rather straight and elongate (Text-fig. 51) and the distivolsella is somewhat quadrate with a weakly impressed diagonal ridge (Text-fig. 72). The aedeagus is terminally weakly bilobate with

TABLE 1

Comparison of the subgenera of *Habronyx*

HABRONYX (*HABRONYX*)	*HABRONYX* (*CAMPOSCOPUS*)	*HABRONYX* (*HABROCAMPULUM*)	*HABRONYX* (*AUSTRANOMALON*)
Cephalic capsule of larva with epistoma very broad; hypostomal spurs present.	Cephalic capsule of larva with epistoma very slender; hypostomal spurs absent.	Unknown.	Cephalic capsule of larva with epistoma moderately broad; hypostomal spurs absent.
Metanotum not unusually broad; postscutellum broader than long; propodeum less than 1·4 times as long as broad.	Metanotum not unusually broad; postscutellum broader than long; propodeum about 1·4 times as long as broad.	Metanotum broad, postscutellum much longer than broad; propodeum about 2·0 times as long as broad.	Metanotum not unusually broad, postscutellum broader than long or quadrate; propodeum less than 1·5 times as long as broad.
Tarsal claws pectinate or simple, moderately large, usually strongly curved, not markedly sexually dimorphic.	Tarsal claws pectinate at least basally, small to moderately large, evenly curved, not markedly sexually dimorphic.	Tarsal claws of ♀ basally pectinate, those of ♂ longer, less strongly curved, simple.	Tarsal claws basally pectinate or simple, those of ♂ long and weakly curved, those of ♀ shorter and more strongly curved.
Wings with CI = 1·3–1·8, MI = 1·2–1·5, NI = 0·5–2·0.	Wings with CI = 0·7–1·3, MI = 1·6–2·1, NI = 3·5+.	Wings with CI = 0·8–1·0, MI = 1·5–1·7, NI = 0·8–1·0.	Wings with CI = 1·0–1·9, MI = 1·2–1·5, NI = 0·9–1·4.
Hind trochanter 1·5–2·0 times as long as trochantellus.	Hind trochanter 1·2–1·5 times as long as trochantellus.	Hind trochanter 0·9–1·1 times as long as trochantellus.	Hind trochanter 0·9–1·5 times as long as trochantellus.
Distivolsella slender, distally swollen.	Distivolsella slender, distally swollen.	Distivolsella almost quadrate, flattened.	Distivolsella almost quadrate, flattened.

the ventral and dorsal membranous areas united apically. The dorsal region of this membrane bears a number of tubercles, whilst the ventral region is devoid of any obvious sculpture except for scattered spines at the extreme basal corner (Text-fig. 106). Dorsally the aedeagus is fairly heavily sclerotized but there is an indistinctly defined membranous area on the extreme dorsal margin of the central region, near the angulation. The aedeagus does not have the ventral area laterally extended.

There are in the collections of the BMNH and the Australian National Insect Collection a series of specimens which represent a series of closely interrelated species. This group of species is difficult to place as in some features it is intermediate between *Habronyx* and *Gravenhorstia* (*Erigorgus*). For the present this group is retained as a separate subgenus of *Habronyx* on account of having the notauli distinct, although they are very weak in some species.

As *Habronyx* contains four distinctive species-groups it is suggested that it be subdivided into four subgenera, *H.* (*Habronyx*), *H.* (*Camposcopus*), *H.* (*Habrocampulum*) and *H.* (*Austranomalon*). This system of classification, that is the division of a genus into four subgenera, may seem an unnecessary complication in the taxonomy of an already complex group. The Therionini are a large group of morphologically rather uniform species, and there are few characteristics that are specific to any one genus. In consequence there has often been a genus erected on the basis of a single or relatively few more obvious features, and certain genera are more easily definable by their lack of characters (such as frontal lamellae, hirsute eyes, unicalcarate mid tibiae or carinate fore coxae) than they are by positive features. As a result a range of rather heterogeneous species have come to be included within some genera. Examination of a large number of characteristics and consideration of the combinations of these features clearly showed that the proposed subgenera are quite distinct from one another, and that the status of these groups as subgenera is in keeping with the taxonomy of the group as a whole.

Subgenus ***HABRONYX*** Foerster

Habronyx Foerster, 1868 : 145. Type-species: *Habronyx gravenhorstii* Foerster, 1868 : 148 [= *Anomalon heros* Wesmael, 1849 : 125], by monotypy.

Acanthostoma Kriechbaumer, 1895 : 128. Type-species: *Acanthostoma japonicum* Kriechbaumer, 1895 : 129 [= *Anomalon insidiator* Smith, 1874 : 396], by monotypy.

Macrostemma Shestakov, 1923 : 46. Type-species: *Macrostemma elegans* Shestakov, 1923 : 46, by monotypy.

Formosanomalon Uchida, 1928 : 241. Type-species: *Formosanomalon baibarense* Uchida, 1928 : 241, by monotypy.

Inner margins of eyes subparallel; inter-ocellar distance 0·8–1·0 times as long as orbital ocellar distance; frons with or without a median vertical carina, rarely with a lamella. Clypeal apex rounded with a moderate to large median tooth. Genae broad to narrow, head often very buccate; genal carina joining base of mandible and separated from hypostomal carina.

Pronotum with lower corner acutely pointed, without an anterior tooth. Mesoscutum in profile angularly rounded, without an apical concavity. Epicnemial carina long to absent, if short then with upper end remote from hind margin of pronotum, if long then seldom with upper end reaching hind margin of pronotum. Scutellum flat to convex, punctate, reticulate or coriaceous; postscutellum short, much broader than long, convex. Propodeum from moderately long to short and swollen.

Tarsal claws moderate to long, from almost completely to only basally pectinate.

Forewing with first subdiscal cell explanate distally; vein *Rs* sinuate. Hindwing with 13–19 hamuli on vein R_1.

CI = 1·35–1·72; BI = 1·55–2·10; DBI = 0·60–0·85; RI = 1·60–2·00; NI = 0·59–2·00; ICI = 2·60+; MI = 1·20–1·48; PI = 3·50–5·00.

♂ genitalia. Ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short. Gonolaciniae abruptly angled about 60° distally; teeth large; apodeme straight, extending 0·5 times the length of basivolsellar strut. Distivolsella slender, basally about 0·5 times as wide as long; clasping surface concave, distally swollen with teeth diagonally arranged on proximal face of swelling. Proximal end of paramere simply acute; ergots large and conspicuous. Aedeagus in profile various, but with separate dorsal and ventral membranous areas, the latter spinose and not laterally extended; lateral sclerotized region of aedeagus usually reaching distal apex (Text-figs 68, 87, 100, 102–105).

Distribution. Species of this subgenus are recorded from the Palaearctic, Oriental, Australian and Neotropical regions. An undescribed species is known from southern Africa.

Included species. Specimens of the following have been examined and found referable to this subgenus:

H. (*Habronyx*) *heros* (Wesmael), *H.* (*Habronyx*) *orbitalis* (Morley) **comb n.**, *H.* (*Habronyx*) *pyretorus* (Cameron), *H.* (*Habronyx*) *australasiae* (Morley) **comb. n.**, *H.* (*Habronyx*) *fulvipes* Townes, Momoi & Townes, *H.* (*Habronyx*) *regalis* (Morley), *H.* (*Habronyx*) *elegans* (Shestakov) and *H.* (*Habronyx*) *baibarense* (Uchida).

Subgenus ***CAMPOSCOPUS*** Foerster **stat. n.**

Camposcopus Foerster, 1868 : 145. Type-species: *Camposcopus aclerivora* Rowher, 1915 : 226, by monotypy.

Labrorychus Foerster, 1868 : 146. Type-species: *Anomalon nigricorne* Wesmael, 1849 : 126, by monotypy.

Blaptocampus Thomson, 1892 : 1765. Type-species: *Anomalon nigricorne* Wesmael, 1849 : 126, by subsequent designation (Viereck, 1914*a* : 22).

Inner margins of eyes ventrally convergent; inter-ocellar distance 1·1–1·2 times as long as orbital ocellar distance; frons with or without a strong median vertical carina. Clypeal apex pointed, with a small median tooth. Genae narrow, head never posteriorly buccate; genal carina joining base of mandible contiguous with hypostomal carina.

Pronotum with lower corner truncate, without a tooth. Mesoscutum in profile angularly rounded, without an apical concavity. Epicnemial carina long, upper end joining hind margin of pronotum above the centre of mesopleuron. Scutellum flat, weakly coriaceous; postscutellum short, much broader than long, very convex. Propodeum long, not swollen.

Tarsal claws short, not longer than arolium, pectinate almost to apices.

Forewing with first subdiscal cell not explanate distally; vein *Rs* not sinuate. Hindwing with 9–12 hamuli on vein R_1.

CI = 0·75–1·25; BI = 1·10–1·49; DBI = 0·60–0·70; RI = 1·40–1·60; NI = 3·50+; ICI = 1·30–1·65; MI = 1·60–2·10; PI = 2·50–3·30.

♂ genitalia. Ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short. Gonolaciniae abruptly angled about 90° distally; teeth small; apodeme straight, extending 0·5 times the length of basivolsellar strut. Distivolsella slender, basally about 0·4 times as wide as long; clasping face concave with distal end swollen, the swollen end bearing peripheral spines. Paramere proximally simply rounded. Aedeagus in profile sinuate, apically truncate, with separate dorsal and ventral membranous areas, the latter not spinose but laterally extended into triangular flanges; lateral sclerotized region of aedeagus reaching distal apex, bearing blunt tubercles (Text-figs 60, 101).

Distribution. Species of this subgenus are recorded from all regions except the Ethiopian and Neotropical.

Included species. Specimens of the following have been examined and found referable to this subgenus:

H. (*Camposcopus*) *nigricornis* (Wesmael), *H.* (*Camposcopus*) *aclerivorus* (Rowher), *H.* (*Camposcopus*) *canaliculatus* (Holmgren), *H.* (*Camposcopus*) *perspicuus* (Wesmael), *H.* (*Camposcopus*) *tonnaiensis* (Uchida), *H.* (*Camposcopus*) *maidan* (Shestakov), *H.* (*Camposcopus*) *sonani* (Uchida) and *H.* (*Camposcopus*) *maxillaris* (Uchida).

Subgenus ***HABROCAMPULUM*** **subgen. n.**

Type-species: *Anomalon biguttatum* Gravenhorst, 1829 : 642.

Inner margins of eyes weakly convergent ventrally; inter-ocellar distance 1·1–1·3 times as long as orbital ocellar distance; frons with a weak median vertical carina. Clypeal apex weakly rounded with a small median tooth. Genae narrow, head not buccate; genal carina reflexed weakly, joining hypostomal carina at mandibular base.

Pronotum with lower corner obliquely truncate, with a distinct tooth near the anterior corner. Mesoscutum in profile evenly but rather abruptly rounded with a small concavity near the apical margin. Epicnemial carina short, upper end angled to meet lower corner of pronotal margin. Scutellum very convex, punctate; postscutellum much longer than broad, weakly convex. Propodeum very elongate, 2·0 times or more as long as broad centrally; basally almost parallel sided.

Tarsal claws not long, indistinctly pectinate basally (more so in ♂ than ♀) (Text-figs 219, 220).

Forewing with first subdiscal cell distally explanate; *Rs* not sinuate; hindwing with 10–12 hamuli on R_1.

CI = 0·80–1·10*; BI = 1·45–1·80*; DBI = 0·55–0·65*; MI = 1·50–1·70*; RI = 1·25–1·55*; NI = 0·80–1·00*; ICI = 1·20–1·35*; PI = 2·40–2·90*.

♂ genitalia. Ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short. Gonolacinia slender, distally weakly angled about 30°; teeth of moderate size; apodeme straight, extending 0·6 times the length of basivolsellar strut. Distivolsella moderately broad, basally 0·6 times as wide as long; clasping face concave with peripheral ridge bearing spines. Paramere proximally simply acute. Aedeagus in profile weakly angled, apically rounded, with dorsal and ventral membranous areas confluent apically, the latter neither spinose nor laterally extended; lateral sclerotized region of aedeagus not reaching distal apex (Text-figs 51, 72, 106).

As this subgenus is known only from a little material, and as it does not have any obvious affinities with other Therionini, the author has chosen to retain it within *Habronyx* as suggested by Townes (1971) although it has been accorded separate subgeneric distinction. The above descriptions, and the dendrogram (Text-fig. 249) clearly indicate that this species is not very closely related to either of the preceding subgenera, and it is quite possible that when more material is available this subgenus may be accorded separate generic status.

Distribution. This subgenus is only recorded from the western Palaearctic Region.

Included species. Only one species, the type-species, is at present known to be referable to this subgenus.

Subgenus *AUSTRANOMALON* subgen. n.

Type-species: *Habronyx* (*Austranomalon*) *pammi* sp. n.

Inner margins of eyes subparallel, the eye surface glabrous or with short sparse pubescence; lower face flat. Clypeus weakly produced apically, or rounded, with or without a median apical tooth; mandible subequally bidentate or with lower tooth distinctly the shorter. Genal carina reaching the hypostomal carina at base of mandible; frons with at most an indistinct median vertical carina, often with a median vertical impressed groove.

Pronotum usually with lower corner acute, without a tooth; mesoscutum in profile varying from almost evenly rounded to angularly rounded, with at most an indistinct apical concavity. Epicnemial carina short, usually not extending above lower corner of pronotum, upper end distant from anterior margin of mesopleuron. Propodeum quite short, posteriorly extended about 0·5 times the length of hind coxae.

Tarsal claws long, weakly curved, those of ♀ somewhat shorter, more curved and more extensively pectinate than those of ♂; pecten of claws not extending beyond centre (Text-figs 213, 214).

Forewing with first subdiscal cell distally explanate; *Rs* not or weakly sinuate; hindwing with 10–15 hamuli on vein R_1.

CI = 1·00–1·88; BI = 1·45–2·15; DBI = 0·55–0·75; MI = 1·25–1·45; RI = 1·35–2·20; NI = 0·90–1·40; ICI = 1·00+; TI = less than 1·50.

♂ genitalia. Ninth abdominal sternite transverse; gonosquamae short and truncate. Gonolacinia distally evenly curved about 50°; teeth small; apodeme straight, extending about 0·4 times the length of basivolsellar strut. Distivolsella broad, basally about 0·75 times as wide as long; clasping face flat with a weak peripheral ridge bearing small teeth. Aedeagus in profile medianly angled, apically with a dorsal lobe, dorsally weakly convex; apicodorsal lobe membranous, irregularly delineated proximally; ventral membranous area present, spinose, laterally weakly extended (Text-figs 84–107).

This is not an easy group to define, as it has features not only of *Habronyx* but also of *Gravenhorstia* (*Erigorgus*) and *Barylypa*. From a detailed study of the material in the Australian National Insect Collection, it became apparent that the species of this group are closely interrelated, yet when considered as a whole the group was found to vary in certain characters which are far less variable in species groups from other zoogeographic regions, and have in consequence been used to facilitate generic separation, especially in the western Palaearctic region. The most widely used and apparently invariable character utilized to separate *Habronyx* from *Gravenhorstia* is the shape of the mesoscutum in profile. The present study of species placed in this subgenus has shown that there is an almost continuous gradation from having the mesoscutum angularly rounded with distinctly impressed notauli to having the mesoscutum evenly rounded without notauli. Species with the former facies are included within *Habronyx*, and for the present it is most convenient to include *Austranomalon* species which always have a trace of notauli within *Habronyx*. However, this group of Australian insects are clearly related to *Gravenhorstia* in the form of the male genitalia. The distivolsella is almost quadrate and flat, whereas those of *Habronyx* (*Habronyx*) are slender and distally swollen (Text-fig. 68). The aedeagi of *Austranomalon* species are lobed similar to those of *Erigorgus*, although they resemble *Habronyx australasiae* in having the dorsal membranous region irregularly defined proximally (Text-figs 105, 107, 108, 109).

It has been possible to examine the cephalic capsule of the final instar larva of some species of *Habronyx* (*Austranomalon*). The structure of this was found to be very like that of *Gravenhorstia* (*Erigorgus*) and not at all like that of *Habronyx* (*Habronyx*) or *H.* (*Camposcopus*). However, as noted earlier, there is an extremely great difference in the form of the cephalic capsules of these two closely related subgenera, larger species tending to have massively sclerotized hypostomae, epistomae and pleurostomae, whereas small species tend to have disproportionately slender hypostomae etc.

The evaluation of a large number of characters in the phenetic investigation has shown that *Austranomalon* species have more features in common with *Gravenhorstia* than *Habronyx*. However, if *Austranomalon* were included as a subgenus of *Gravenhorstia*, then it would be extremely difficult to define the genus *Gravenhorstia* as a whole and for the present it is most convenient to restrict *Gravenhorstia* to include only the species without any trace of notauli.

DISTRIBUTION. This subgenus has only been recorded from the Australian region.

INCLUDED SPECIES. *Habronyx* (*Austranomalon*) *pammi* sp. n.

Habronyx (*Austranomalon*) *pammi* sp. n.

Holotype ♀, AUSTRALIA: New South Wales, 6·5 km (4 miles) north Batemans Bay, 29.ix.1959 (*E. F. Riek*) (ANIC).

Apex of clypeus evenly rounded with a small median apical tooth (Text-fig. 160); lower mandibular tooth 0·6 times the length of upper, lower margin of mandible basally with a small flange; anterior tentorial pit very ellipsoidal; frons rugose with a weak median vertical impression. Flagellum longer than gaster, with about 60 segments.

Mesoscutum with an indistinct median apical concavity, in profile almost evenly rounded; extreme anterior margin with a pair of latero-median polished triangular areas, remainder of mesoscutum punctate except for the notauli which are weakly impressed, rugose, and extend well beyond the centre of the mesoscutum; scutellum flattened, not laterally carinate.

Forewing with 2 + 3*rm* distal to 2*m–cu*; CI about 1·25; hindwing with NI about 0·70.

Ovipositor 0·75 times length of tergite 2.

Head black; lower face usually completely yellow, rarely with a pair of indistinct black marks; mouthparts except for the apices of mandibles, genae for 0·5 of their length and marks on vertex yellow. Antennae blackish, scape ventrally yellow marked.

Thorax black; tegulae, scutellum, occasionally post-scutellum and a central mark on mesoscutum yellow.

Fore and mid legs yellow, the femora and mid coxae infuscate. Hind legs reddish brown to blackish brown, usually with tibia with a subbasal pale band; distal 0·3 of basitarsus and tarsi 2–4 completely yellow.

Abdomen reddish brown; dorsum of tergite 2 black and dorsa of following tergites infuscate.

♂ similar to ♀ but with hind tarsi 2–4 distinctly thickened, ventrally somewhat flattened.

Paratypes. AUSTRALIA: 2 ♀, Australian Capital Territory, Jervis Bay, 7.xi.1956 (*E. F. Riek*) (ANIC); 1 ♂, Tasmania, Freycinet National Park, 28.ii.1963 (*I. Common & M. Upton*) (ANIC); 1 ♀, Queensland, Biggenden, 1–19.xii.1971 (*H. Frauca*) (ANIC); 1 ♀, Brisbane, no further data (*H. Hacker*) (BMNH); 1 ♀, New South Wales, Mt Wilson, 27.ii.1936 (*M. F. Day*) (ANIC); 1 ♂, Queensland, Brisbane, 17.i.1912 (*H. Hacker*) (QM); 1 ♀, Queensland, Bright Valley (*H. W. Davey*) (QM).

Three further described species, all of which are only known from isolated specimens, are also referable to this subgenus. These are *Exochilum robustum* var. *transpositor* Morely, *Exochilum sulcator* Morley and *Laphyctes trilineata* Cameron. *Habronyx* (*Austranomalon*) *transpositor* **comb. n.**, *Habronyx* (*Austranomalon*) *sulcator* **comb. n.** and *Habronyx* (*Austranomalon*) *trilineatus* **comb. n.** are new combinations. At least three further undescribed species, represented in the Australian National Insect Collection, are referable to this subgenus.

Genus ***APHANISTES*** Foerster

Aphanistes Foerster, 1868 : 145. Type-species: *Anomalon bellicosum* Wesmael, 1849 : 122 by subsequent designation (Viereck, 1914*a* : 13).

Anochilacrum Enderlein, 1921 : 12. Type-species: *Anochilacrum flavigena* Enderlein, 1921 : 12, by original designation.

Eye without pubescence or with sparse scattered hairs, inner margins weakly convergent ventrally to subparallel; occipital carina complete, close to posterior ocelli; frons usually with an inter-antennal lamella. Antennae long, those of ♂ without a white band; scape truncate, about 2·0 times as long as pedicel; fourth flagellar segment about 3·0 times as long as broad. Clypeus with a median apical tooth; mandibles bidentate, apex not twisted, upper tooth distinctly the longer; labial palp with four segments, except in *A. hyalinus* which has three segments; cardo basally lobed. Genal carina joining base of mandible separate from hypostomal carina.

Pronotum dorsally long, subvertical, with a transverse furrow; posterior corner of pronotum twisted, and at most occluding about 0·2 of spiracular sclerite; lower anterior margin without a tooth, lower corner truncate. Anterior of mesoscutum abruptly rounded with an apical concavity; notauli weak, not extending beyond 0·65 times length of mesoscutum; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina various, medio-ventrally not or weakly raised; sternaulus absent; posterior transverse carina of mesosternum interrupted in front of each mid coxa.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter subequal in length to trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws curved, pectinate to apices, not obviously sexually dimorphic.

Forewing with *Rs* sinuate; *2 · 3rm* proximal to *2m cu*; *1m–cu* and Cu_{1a} basally separated. Hindwing with 10–15 hamuli on R_1; distal abscissa of Cu_1 present.

CI = 1·23–2·10; BI = 1·50–1·90; DBI = 0·47–0·75; MI = 1·30–1·60; RI = 1·90–2·40; NI = 1·40–5·00; ICI = 1·15–1·80; PI = 2·60–3·50.

Propodeum reticulate, spiracle at least 2·0 times as long as broad; apex of propodeum reaching about 0·3 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 a little shorter than apical abdominal depth; apex of ovipositor constricted, constricted part at least 4 times as long as median thickness of ovipositor; extreme apex weakly decurved; ovipositor weakly laterally compressed (Text-fig. 21).

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short. Gonolacinia distally evenly rounded about 80°; teeth small; apodeme straight, extending about 0·25 of length of basivolsellar strut. Distivolsella moderately slender, basally about 0·6 times as wide as long; clasping face concave with teeth arranged linearly on a transverse ridge. Paramere proximally weakly spatulate, terminally obliquely truncate. Aedeagus in profile angled, apically bilobate, dorsally flattened; dorsal membranous area small, situated on extreme apicodorsal corner; ventral membranous area unusually large, densely spinose, often proximally or proximo-laterally extended; lateral sclerotized region of aedeagus indistinct but reaching to distal apex (Text-figs 44, 73, 112–114).

Aphanistes has customarily been placed close to *Erigorgus* on account of the similarity in the position of vein Cu_{1a} in the forewing, but it would seem that this feature should not be interpreted as indicating a close relationship between the genera.

The form of the genitalia indicates that *Aphanistes* may be quite closely related to *Barylypa* and possibly also *Habronyx* (*Habrocampulum*). This relationship is also suggested by analysis of percentage similarity as represented in the dendrogram (Text-fig. 249).

DISTRIBUTION. This genus is predominantly Holarctic with a few species recorded from the Indo-Papuan region, one of which, *A. variicolor*, extends into Northern Australia.

INCLUDED SPECIES. The following species have been examined:

A. hyalinus (Norton), *A. guatemalenus* (Cameron), *A. carinifrons* (Cameron), *A. flavigena* (Enderlein), *A. variicolor* (Morley), *A. villosus* (Tosquinet), *A. bellicosus* (Wesmael), *A. armatus* (Wesmael), *A. coreanus* Uchida, *A. jozankeanus* (Matsumura), *A. ruficornis* (Gravenhorst) and *A. tricolor* Uchida.

Three further undescribed species have also been examined.

Genus ***CLYPEOCAMPULUM*** **gen. n.**

Type-species: *Clypeocampulum tibiale* sp. n.

Eye without pubescence, inner margins parallel; occipital carina not clearly defined, discernible as a discontinuous series of ridges close to posterior ocelli; frons with a median vertical carina. Antennae short, those of ♀ without a white band; scape truncate, about 1·5 times as long as pedicel; fourth flagellar segment about 1·5 times as long as broad. Clypeus moderately pointed without a median apical tooth, unusual in being elaborately sculptured (Text-fig. 167); mandibles bidentate, upper tooth distinctly the longer, apex not twisted; labial palp with four segments; cardo basally lobed. Genal carina joining base of mandible separate from hypostomal carina.

Pronotum dorsally long, subhorizontal, without a transverse groove or furrow; posterior corner of pronotum not occluding spiracular sclerite; lower anterior margin without a tooth, lower corner evenly rounded. Anterior of mesoscutum evenly rounded, without an apical concavity; notauli absent; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse furrows weakly impressed near posterior margin. Epicnemial carina extending well above lower corner of pronotum, its upper end joining the pronotal margin, medio-ventrally not raised; sternaulus indistinct; posterior transverse carina of mesosternum narrowly interrupted in front of each mid coxa.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with one spur. Hind trochanter about 1·2 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws small, pectinate basally, rather weakly angled near apical 0·7.

Forewing with *Rs* almost straight; $2 + 3rm$ proximal to $2m\text{–}cu$; $1m\text{–}cu$ and Cu_{1a} basally separated. Hindwing with 14 hamuli on R_1; distal abscissa of Cu_1 present.

CI = 0·70–0·90*; BI = 1·20–1·30*; DBI = 0·50–0·60*; MI = 1·30–1·40*; RI = 1·40–1·45*; NI = 1·20*; PI = 2·20–2·40*.

Propodeum reticulate, spiracle at least 2·0 times as long as broad; apex of propodeum reaching about 0·3 of length of hind coxae; gaster elongate.

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly truncate, centrally membranous (a unique feature); gonosquamae short. Gonolacinia distally evenly rounded about 45°; teeth moderate; apodeme straight, extending about 0·45 of length of basivolsellar strut. Distivolsella elongate, basally about 0·5 times as broad as long; clasping face rather flat, with a marked diagonal ridge bearing teeth. Paramere proximally slightly swollen, apically rounded. Aedeagus in profile angled, apically bilobate, dorsally concave; apicodorsal membranous area discrete, ventral membranous area present, the latter without spines, and laterally weakly extended; lateral sclerotized region of aedeagus reaching to the distal apex and apically bearing small spines (Text-figs 59, 83, 91, 115).

The features distinguishing *Clypeocampulum* from all described Palaearctic genera are the sculptured clypeus, indistinct occipital carina and single mid tibial spur. It is difficult to ascertain as to where this genus should most correctly be placed. The wing venation and general morphology show a similarity to *Barylypa*. However, the aedeagus is very unlike that of *Barylypa*, and more reminiscent of *Habronyx* (*Habrocampulum*). The lack of notauli, absence of a transverse furrow on the pronotum and position of Cu_{1a} in the forewing clearly exclude *C. tibiale* from *Habronyx*. It is suggested that for the purpose of cataloguing, *Clypeocampulum* should be included between *Aphanistes* and *Barylypa*.

Clypeocampulum is similar to *Liopterna* in venation and possession of a single mid tibial spur, but differs from this genus (as described by Townes, 1971) in the following ways:

—clypeus sculptured; that of *Liopterna* is not;
—occipital carina incomplete; that of *Liopterna* is complete;
—mesoscutum evenly rounded anteriorly; that of *Liopterna* is abruptly rounded;
—epicnemial carina reaching anterior margin of mesopleuron at level of posterior pronotal impression; that of *Liopterna* extends only just above level of lower corner of pronotum;
—tarsal claws small and basally pectinate; those of *Liopterna* are long, weakly curved and not pectinate (as both species are described from males, this may not be attributed to sexual dimorphism);
—posterior transverse carina of mesosternum narrowly interrupted before each mid coxa; that of *Liopterna* is absent except for a lateral vestige;
—mandible bidentate; that of *Liopterna* is unidentate.

Distribution. This genus is only recorded from Turkey.

Included species. Only the type-species is referable to this genus at present.

Clypeocampulum tibiale **sp. n.**

Holotype ♂, Turkey: Mugla, 40 kms, Fethiye-Ortaca road, 15.iv.1962 (*Guichard & Harvey*) (BMNH).

Forewing 7·5 mm.

Lower face flat, punctate; distance from orbit to anterior tentorial pit much less than distance from orbit to base of mandible; frons rugose, median vertical carina about 2·0 times as raised as broad, extending from just below median ocellus to between antennal bases. Flagellum with 31 segments. Head posteriorly neither buccate nor strongly narrowed.

Mesoscutum with weak transverse furrows before scuto-scutellar groove, centrally coarsely punctate, laterally finely punctate; scutellum convex, not carinate laterally.

Head black, inner margins of eyes broadly yellow; vertex with brown marks extending down the genae for 0·25 of their length; antennae brown, scape yellow-marked ventrally.

Thorax immaculately black; coxae black; forelegs yellowish, middle and hind legs brown; hind trochanter and trochantellus darker; all tibiae with a pronounced whitish pubescence.

Abdomen dark brown, apical segments entirely black; tergites 2 and 3 basally black; gonosquamae brown.

♀ unknown.

Paratype. TURKEY: 1 ♂, Adana, Ciftehan, 26.v.1960 (*Guichard & Harvey*) (BMNH).

Genus *BARYLYPA* Foerster

Barylypa Foerster, 1868 : 146. Type-species: *Anomalon genalis* Thomson, 1892 : 73, by subsequent designation (Viereck, 1914*a* : 19).

Laphyctes Foerster, 1868 : 146. Type-species: *Laphyctes insidiator* Foerster, 1878 : 73, by subsequent designation (Viereck, 1914 : 19). [Homonym of *Laphyctes* Dujardin, 1844.]

Sarntheina Dalla Torre, 1901 : 161. [Replacement name for *Laphyctes* Foerster.]

Hadromanus Szépligeti, 1905*a* : 14. Type-species: *Anomalon laevicoxis* Schmiedeknecht, 1900 : 241, by monotypy. **Syn. n.**

Magnibucca Morley, 1913*a* : 79. Type-species *Magnibucca testacea* Morley, 1913*a* : 80, by monotypy.

Trochiscomerus Meyer, 1931 : 8. Type-species: *Trochiscomerus schmiedeknechti* Meyer, 1931 : 9, by monotypy. **Syn. n.**

Eye without pubescence, inner margin at most weakly convergent ventrally; occipital carina complete, close to posterior ocelli; frons with a median vertical carina. Antennae short to moderately long, those of ♀ without a white band; scape truncate, about 1·2–1·5 times as long as pedicel; fourth flagellar segment about 2·5 times as long as broad. Clypeus with, rarely without, a median apical tooth; mandibles bidentate, apex not twisted, upper tooth distinctly the longer; labial palp with four segments; cardo basally lobed. Genal carina joining hypostomal carina at or immediately before the mandibular base.

Pronotum dorsally long, subhorizontal, without a transverse furrow (Text-fig. 207); posterior corner not covering spiracular sclerite; lower anterior margin of pronotum without a tooth, lower corner truncate. Anterior of mesoscutum abruptly rounded without an apical concavity; notauli weak or absent; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse impressed furrows absent. Epicnemial carina various, not medio-ventrally produced; sternaulus indistinct; posterior transverse carina of mesosternum interrupted in front of each mid coxa.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two spurs. Hind trochanter more than 2·0 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws curved, basally pectinate, not obviously sexually dimorphic.

Forewing with *Rs* straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separated. Hindwing with 10–15 hamuli on R_1; distal abscissa of Cu_1 present.

CI = 0·25–0·65; BI = 1·40–1·80; DBI = 0·40–0·60; MI = 1·30–1·70; RI = 1·00–2·30; NI = 0·70–3·10; ICI = 2·30+; PI = 3·50–4·00.

Propodeum reticulate, spiracle about 2·0 times as long as broad; apex of propodeum reaching about 0·5 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 a little longer than apical abdominal depth; apex of ovipositor constricted, constricted part less than 3·0 times as long as median thickness of ovipositor; extreme apex weakly decurved with small lateral teeth; ovipositor not obviously laterally compressed (Text-fig. 19).

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short and obtuse. Gonolaciniae distally evenly rounded about 75°, teeth small; apodeme continuous, not angled, extending about 0·4 of length of basivolsellar strut. Distivolsella moderately broad, basally about 0·65 times as wide as long; clasping face flat with a weak transverse or diagonal ridge bearing teeth. Paramere proximally rounded. Aedeagus in profile fairly straight, apically truncate, dorsally flat; small apical membranous area present, remainder of aedeagus heavily and evenly sclerotized except for a long ventral spinose area, which is not laterally extended (Text-figs 64, 88, 118, 119).

Perkins (1962) pointed out that Viereck (1914) made an invalid selection of type for the genus *Erigorgus*; Brischke assigned three species definitely to *Erigorgus*, namely *Anomalon fibulator* Gravenhorst, *A. perspicillator* Gravenhorst and *A. rufum* Holmgren and also described *Anomalon* (?*Erigorgus*) *carinatum* as new. The selection of this species as type by Viereck was erroneous because a species doubtfully referred to a genus is not available for selection as the type-species. As a result of this invalid selection of type-species, Morley included *Barylypa* within *Erigorgus* (= *Anomalon* Jurine sensu authors). Perkins corrected this matter be selecting *Anomalon fibulator* Gravenhorst as the type-species of *Erigorgus* and placing *A. carinatum* within *Barylypa*.

Several species included by later authors within *Barylypa*, that is *B. uniguttata*, *B. humeralis*, *B. delictor* and *B. pallidens*, have been transferred to the genus *Hadromanus* by Townes (1971).

The distinction between *Barylypa* and *Hadromanus* is not particularly clear. The former is described as having the notauli present, but weak, reaching the centre of the mesoscutum or beyond, whereas *Hadromanus* species have no discernible notauli. However, there are in the collections of the BMNH a number of specimens of *B. carinata* (det. J. F. Perkins) which have no discernible notauli.

A further described difference between the two groups is the position of the epicnemial carina. *Barylypa* is described as having the epicnemial carina distant from the front edge of the mesopleuron and extending above the lower corner of the pronotum, whereas in *Hadromanus* the upper end of the epicnemial carina is angled to meet the front edge of the mesopleuron at the lower corner of the pronotum. There are specimens in both groups in which the epicnemial carina is short, not extending above level of lower corner of pronotum, and not angled at upper end.

It is apparently possible to distinguish between these two species-groups by examination of the wing venation (these hitherto overlooked characters were found to work for the twenty species examined). In *Hadromanus* BAI = 0·80–0·95 and NI = 1·25–3·10, but in *Barylypa* BAI = 1·05–1·15 and NI = 0·70–0·85.

In specimens referable to both groups there is some variation in the position of the petiolar spiracles, and in the position of the genal carina which makes generic separation using these characters unreliable.

The male genitalia of the two groups have been found to be very similar indeed and quite distinct from the remaining Therionine genera. Although some specific differences were observed it was not found to be possible to separate *Hadromanus* from *Barylypa* using features of the male genitalia.

In view of the close similarity between *Barylypa* and *Hadromanus*, it is suggested that the latter genus be included with *Barylypa* as formally stated above.

Townes (1971) included *Trochiscomeris schmiedeknechti* within *Hadromanus*. In this work the genus *Trochiscomeris* is treated as a synonym of *Barylypa*. However, it has not been possible to examine the holotype, and only specimen known, of *T. schmiedeknechti* as the specimen was destroyed. The description by Meyer (1931) indicates that his specimen may have been an exceptional one. It differed from the above generic diagnosis in having the 2 + 3*rm* vein distal to 2*m–cu* (the position of 2 + 3*rm* is a particularly variable feature) and having the hind tibia with a single spur. The author has not found any other Anomalonids with a single hind tibial spur but it has been noted that there is occasional reduction or even the atrophy of one mid tibial spur (this reduction is usually only found on one leg) and it is therefore possible that the specimen Meyer had before him was in fact a unique and malformed specimen. Unless further specimens are discovered *Trochiscomeris* is undoubtedly best included here.

DISTRIBUTION. The species of this genus are most common in the southern Palaearctic region, but the genus is widely distributed throughout all regions except the Ethiopian.

INCLUDED SPECIES. The following species were examined:

B. elongata (Davis), *B. sulcata* (Provancher), *B. bipartita* (Morley), *B. xanthomelas* (Brullé), *B. apicate* (Cameron), *B. coarctata* Ashmead, *B. perturbans* Morley, *B. victoriana* Morley, *B. carinata* (Brischke), *B. delictor* (Thunberg), *B. humeralis* Brauns, *B. insidiator* Foerster, *B. rubricator* (Szépligeti), *B. rufa* (Holmgren), *B. uniguttata* (Gravenhorst), *B. longicornis* Brauns, *B. testacea* (Morley) and *B. frisiaca* Habermehl.

Three further undescribed species have also been examined.

Genus ***CORSONCUS*** Townes

Corsoncus Townes, 1971 : 141. Type-species: *Anomalon magum* Cresson, 1874 : 379, by original designation.

Eye without pubescence, inner margin weakly convergent ventrally; occipital carina usually completely absent on upper 0·5 of head, but strong and often raised into a flange latero-ventrally, rarely with medio-dorsal part only of occipital carina present on upper 0·5 of head; frons with a faint median vertical carina. Antennae moderately long, those of ♀ without a white band; scape truncate, 2·0 times as long as pedicel; fourth flagellar segment about 2·5 times as long as broad. Clypeus with median apical tooth; mandibles bidentate, lower tooth distinctly shorter than upper tooth, apices not twisted; labial palpi with four segments. Genal carina reaching base of mandible.

Pronotum dorsally long, subhorizontal, without or with very indistinct transverse furrow; posterior corner not covering spiracular sclerite; lower anterior margin of pronotum without a tooth, lower corner truncate. Anterior of mesoscutum abruptly rounded without an apical concavity; notauli broad and shallow, extending beyond centre of mesoscutum; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent; transverse furrows absent. Epicnemial carina not reaching to centre of mesopleuron, close to anterior margin of pleuron, medio-ventrally rather strongly raised into a flange; sternaulus represented by a more coarsely punctate area; posterior transverse carina of mesosternum interrupted in front of each mid coxa.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter about 1·2 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws rather small, pectinate nearly to apex, not obviously sexually dimorphic.

Forewing with *Rs* almost straight; 2 + *3rm* proximal to *2m–cu*; *1m–cu* and Cu_{1a} basally separated. Hindwing with 11–13 hamuli on R_1; distal abscissa of Cu_1 present.

CI = 0·30–0·40; BI = 1·20–1·35; DBI = 0·55–0·65; MI = 1·30–1·50; RI = 1·40–1·65; NI = 3·30–4·15; ICI = 2·10–2·30; PI = 2·70–5·00.

Propodeum reticulate, spiracle about 2·0 times as long as broad; apex of propodeum reaching about 0·6 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 slightly longer than apical abdominal depth; apex of ovipositor constricted, constricted part about 3·0 times as long as median thickness of ovipositor; extreme apex a little decurved; ovipositor laterally compressed weakly.

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short and obtuse. Gonolaciniae distally evenly curved about 80°; teeth large; apodeme angled about 10° from axis, very short, not reaching 0·2 of length of basivolsellar strut. Distivolsella moderately broad, basally about 0·65 times as wide as long; clasping face weakly concave with transverse ridge bearing teeth. Aedeagal paramere proximally weakly spatulate, terminally rounded. Aedeagus in profile weakly sinuate, distal end expanded, apex abruptly rounded; small dorsal membrane extending distally and curved to form hook-shaped appendage; remainder of aedeagus weakly but evenly sclerotized, except for apicoventral region which is spinose and membranous.

Species of this genus are exceptional in having a lateral vertical keel immediately proximal to the anterior ventral membrane on the aedeagus (Text-figs 79, 85, 120).

Corsoncus species closely resemble *Barylypa*, especially *B. relictum* and *B. orbitale*. The distinguishing feature of *Corsoncus* is the form of the occipital carina. However, specimens of *B. relictum* and *B. orbitale* exist (in the collections of the BMNH) in which the occipital carina is absent laterally above the centre, though present centrally. This is very similar to an undescribed species of *Corsoncus* from Mexico (R. C. L. Perkins coll., BMNH). There is a second undescribed species from Vera Cruz (H. H. Swinnerton coll., BMNH) which has all the features of *Corsoncus* except that the occipital carina is present except centrally. The Vera Cruz specimen has, like *C. magus*, the epomia strongly divergent from the anterior margin of the pronotum but the Mexican species has the epomia less strongly divergent. The variation of these features suggest that it would perhaps be more consistent to include *Corsoncus* within *Barylypa*.

The form of the male genitalia of *Corsoncus* is particularly distinct from that of *Barylypa* in having a raised lateral keel. This unusual feature is also found in *B. relictum* and *B. orbitale*. This aedeagal keel is not found in other New World *Barylypa* species, as *B. anale* (Say) was found to have an aedeagus without a keel, and of the typical *Barylypa* form. This latter species also has the occipital carina complete. It is therefore apparent that *C. magus*, *B. relictus*, *B. orbitalis* and the undescribed *Corsoncus* species constitute a distinct species-group, and for the present it is suggested that all species are included within *Corsoncus* as a distinct genus.

Corsoncus may be distinguished from *Barylypa* in having the occipital carina incomplete, usually centrally, but also sometimes laterally, and in having an aedeagus with a raised lateral keel. The status of *Corsoncus* needs further investigation.

Distribution. This genus is recorded only from the New World.

Included species. The following species were examined: *C. magus* (Cresson), *C. relictus* (F.) **comb. n.** and *C. orbitalis* (Cresson) **comb. n.** Two further undescribed species have been examined.

Genus ***LIOPTERNA*** Townes

Liopterna Townes, 1971 : 138. Type-species: *Liopterna schlingeri* Townes, 1971 : 138, by original designation.

Nothing at present can be added to the description included by Townes. This genus is known only from the holotype of the type-species, a male, which lacks the genital capsule.

Distribution. This genus is recorded only from California.

Genus ***PSEUDANOMALON*** Szépligeti

Pseudanomalon Szépligeti, 1905*a* : 33. Type-species: *Pseudanomalon gracile* Szépligeti, 1905*a* : 34, by monotypy.

Eye without pubescence, inner margin weakly convergent ventrally; occipital carina complete, close to posterior ocelli; frons without a median vertical carina. Antennae very long, those of ♀ without a white band; scape truncate, about 1·2 times as long as pedicel; fourth flagellar segment about 4·0 times as long as broad. Clypeus with a median apical tooth; mandibles bidentate, lower tooth obviously the shorter; labial palps with four segments, cardo basally lobate. Genal carina reaching base of mandible separate from hypostomal carina.

Pronotum dorsally narrow, subvertical, with a distinct transverse furrow which is centrally indiscernible; posterior corner completely covering spiracular sclerite; lower anterior margin of pronotum without a tooth, lower corner acute. Anterior of mesoscutum strongly but evenly rounded without an apical concavity; notauli distinct to hind margin of mesoscutum; medio-posterior region of mesoscutum rugose; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina distinct, reaching 0·4 of way up mesopleuron, apically angled to reach anterior margin of pleuron, medio-ventrally not produced; sternaulus discernible as a broad shallow groove; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with numerous macrotrichia on inner surface. Mid tibia with two spurs. Hind trochanter about 2·5 times as long as hind trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws curved, pectinate to apices, not obviously sexually dimorphic.

Forewing with *Rs* almost straight; 2 + 3*rm* distal to *2m–cu*; *1m–cu* and Cu_{1a} basally separated. Hindwing with 9–11 hamuli on R_1; distal abscissa of Cu_1 present.

CI = 1·20–1·40*; BI = 1·40–1·55*; DBI = 0·65–0·75*; MI = 2·30–2·70*; RI = 2·00–3·05*; NI = 3·00+*; ICI = 2·20+*; PI = 3·90–4·30*.

Propodeum reticulate, spiracle about 1·5 times as long as broad; apex of propodeum reaching about 0·4 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 a little longer than apical abdominal depth; apex of ovipositor evenly elongately acute; extreme apex not decurved; ovipositor weakly laterally compressed (Text-figs 6, 14, 28).

♂ genitalia. Single syntergum present; ninth abdominal sternite very transverse, posteriorly truncate; gonosquamae short, acute. Gonolacinia distally abruptly angled about 85°; teeth small but numerous; apodeme angled about 5° to axis, extending about 0·5 of length of basivolsellar strut. Distivolsella moderately broad, basally about 0·65 times as wide as long; clasping face concave, with small ridge bearing teeth. Paramere proximally bluntly rounded. Aedeagus in profile swollen, apically rounded, dorsally convex; narrow apical membranous area present, but remainder of aedeagus rather evenly sclerotized; ergots particularly obvious (Text-figs 40, 77, 117).

This is a particularly distinctive genus. The species are apparently modified for nocturnal existence as they exhibit a pronounced 'Ophionoid facies' (Gauld & Huddleston, in press). This genus does not appear to be particularly closely related to any other described genus.

DISTRIBUTION. Widely distributed throughout the Old World Tropics from central and western Ethiopian regions, to New Guinea and New Hebrides.

Species of this genus appear to be rather rare.

INCLUDED SPECIES. The following species have been examined:
P. gracile Szépligeti, *P. rectum* Morley and three further undescribed species.

Genus *THERION* Curtis

Therion Curtis, 1829 30 : 101. Type-species: *Ichneumon circumflexus* Linnaeus, 1758 : 566, by original designation.

Therium Agassiz, 1846 : 368. [Unjustified emendation.]

Exochilum Wesmael, 1849 : 119, 122. Type-species: *Ichneumon circumflexus* Linnaeus, 1758 : 566, by monotypy.

Eye without pubescence, inner margins ventrally parallel; occipital carina complete, close to posterior ocelli; frons with a median vertical carina or a lamella, or a cornute process, the protruberance not reaching down between antennal bases. Antennae short to moderately long, those of ♀ without a white band; scape truncate, about 1·6 times as long as pedicel; fourth flagellar segment about 1·2 times as long as broad. Clypeus apically truncate; mandible bidentate, apically not twisted, lower tooth a little shorter than upper; labial palp with four segments; cardo basally lobate. Genal carina joining base of mandible.

Pronotum dorsally rather narrow, subvertical, with a transverse impressed furrow; posterior corner not covering spiracular sclerite; lower anterior margin of pronotum with or without a tooth, lower corner acute. Anterior of mesoscutum rather evenly rounded, with a weak apical concavity; notauli weak; medio-posterior region of mesoscutum coarsely punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina reaching above centre of mesopleuron, its upper end reaching anterior margin of pleuron, medioventrally not produced into a flange; sternaulus very broad and shallow; posterior transverse carina of mesosternum interrupted in front of each mid coxa.

Fore coxae smooth; fore tibial spur with numerous sub-acuminate macrotrichia along inner face. Mid tibia with two spurs; hind trochantellus and trochanter approximately equal in length; hind tarsi of ♂ swollen, ventral surface of second and third tarsal segments flattened, with a median longitudinal carina, more or less glabrous; hind tarsal claws curved, pectinate basally, not obviously sexually dimorphic.

Forewing with *Rs* almost straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separated. Hindwing with 11–17 hamuli on R_1; distal abscissa of Cu_1 present.

CI = 0·95–1·40; BI = 2·00–3·00; DBI = 0·95–1·10; MI = 1·45–1·75; RI = 2·10–2·75; NI = 0·45–0·95; ICI = 1·10–1·50; PI = 3·00–3·65.

Propodeum reticulate, spiracles about 2·5 times as long as broad; apex of propodeum reaching 0·6 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 about as long as apical depth of abdomen; apex of ovipositor somewhat constricted, long, slender and acute; extreme apex decurved; ovipositor not laterally compressed; rather heavily sclerotized nodus present dorsally (Text-figs 10, 24).

♂ genitalia. Usually with a single syntergum present; ninth abdominal sternite transverse to rather cubical, posterior margin bowed or rounded; gonosquamae short, variable. Gonolacinia distally abruptly and angularly rounded about 90°; teeth well developed; apodeme angled about 40° from axis of gonolacinia, short, not extending 0·25 of length of basivolsella strut. Distivolsella slender, basally less than 0·5 times as wide as long, distally a little swollen; teeth arranged diagonally across the clasping face. Paramere proximally rounded. Aedeagus in profile geniculate, apically truncate, evenly sclerotized except for membranous areas; apicolateral region of aedeagus with a row of large spines; distal end of lateral sclerotized region angled ventrally, reaching margin of aedeagus and extreme distal end bearing spines; ventral region not laterally extended (Text-figs 38, 57, 69, 123).

Undoubtedly the 'Theriine' genera (that is *Therion*, *Heteropelma* and *Tanypelma*) share a number of common characters, but there is some overlap with other genera. *Therion* is quite distinct from the other two genera in many features, notably the shape of the tarsal claws, shape of the lower face and form of the male genitalia.

The characters that have been used for separating the 'Theriine' genera from the 'Gravenhorstiine' genera are the presence of pronotal tooth, value of DBI, and shape of clypeus. The variation of the values of DBI have already been referred to. The tooth characteristically present on the lower anterior margin of the pronotum in the 'Theriine' genera has been found to be vestigial or absent in many specimens of *Therion* (Text-fig. 202). In *Habronyx* (*Habrocampulum*) *biguttatum*, the pronotal tooth is present (Text-fig. 201) although this species is in other ways typically 'Gravenhorstiine'. It is apparent that the presence of this tooth is not a stable enough character to permit reliable distinction between the 'Theriine' and 'Gravenhorstiine' groups. Some species of *Barylypa* resemble *Therion* in having the clypeus truncate, so therefore the form of the clypeus alone will not allow the distinction of the two groups.

Short (1959) found characters to permit separation of 'Theriine' and 'Gravenhorstiine' final instar larvae, but the larvae of *Trichomma* are intermediate between those of the two groups, and the larvae of *Encardia* are far more similar to those of the 'Theriine' genera, than to the genera to which *Encardia* is presumed closely related.

It is suggested that, whilst accepting the 'Theriine' genera (excluding *Brachynervus*) form a somewhat distinct group, according this group higher taxonomic status than that of a genus-group is not in keeping with the classification of the subfamily as a whole and should not be employed.

The relationships of *Therion* with other genera is not resolved at present. However, a particular combination of features found in *Therion* species has also been observed in other genera. The swollen distivolsella, the broad epistomal arch of the larva, and the 'Aladdin's lamp' egg are features shared by *Therion*, *Heteropelma* and *Tanypelma* (Text-figs 96–98). These features are also found in *Trichomma* (though in a rather modified form) and also in *Habronyx* (*Habronyx*) and to a lesser extent in *H.* (*Camposcopus*). As far as is known none of the other genera share this combination of features. It is suggested, therefore, that the 'Theriine' genera are related to *Habronyx*, and to *Trichomma* (which is evidently a rather specialized genus) less closely.

DISTRIBUTION. This is predominantly a Holarctic genus with some species extending to central America and south-east Asia.

INCLUDED SPECIES. The following species have been examined:

T. circumflexum (L.), *T. brevicorne* (Gravenhorst), *T. nigripes* Dreisbach, *T. fuscipenne* (Norton), *T. texanum* (Ashmead), *T. nox* (Morley), *T. morio* (F.), *T. mussouriense* (Cameron), *T. giganteum* (Gravenhorst), *T. neglectum* (Morley), *T. tenuipes* (Norton) and *T. ericae* Bauer.

Genus ***HETEROPELMA*** Wesmael

Heteropelma Wesmael, 1849 : 120. Type-species: *Heteropelma calcator* Wesmael, 1849 : 120, by monotypy.

Schizoloma Wesmael, 1849 : 120. Type-species: *Ichneumon amictus* (F.), 1775 : 341, by monotypy.

Schizopoma Foerster, 1868 : 145, 220. [Unjustified emendation.]

Eyes without pubescence, inner margins convergent ventrally; occipital carina varying in position from close to posterior ocelli to very widely separated from posterior ocelli; frons with a median vertical carina and a lamella between bases of antennae. Antennae long, those of ♀ without a white band; scape truncate, about 1·6 times as long as pedicel; fourth flagellar segment about 2·0 times as long as broad. Clypeus truncate with or without lateral corners reflexed; mandible bidentate, lower tooth obviously the shorter; labial palps with four segments; cardo basally lobed. Genal carina reaching base of mandible.

Pronotum dorsally long, subvertical, without a transverse impressed furrow; posterior corner partially occluding spiracular sclerite; lower anterior margin of pronotum with a large tooth, lower corner acute. Anterior of mesoscutum abruptly but not irregularly rounded, without an apical concavity; notauli very weak to moderately strongly impressed; medio-posterior region of mesoscutum coriaceous or coarsely punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina usually reaching above centre of mesopleuron, its upper end reaching anterior margin of pleuron, medio-ventrally not raised into flange; sternaulus indistinct; posterior transverse carina of mesosternum complete, not at all interrupted.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two apical spurs, rarely with reduction of the inner spur so superficially appearing unicalcarate. Hind trochanter a little longer than, equal to, or a little shorter than, the trochantellus; ♂ hind tarsi swollen, second segment usually with an elongate sunken area which bears flattened macrotrichia, if rarely without sunken area then flattened macrotrichia are still present on ventral tarsal surface; hind tarsal claws geniculate, basally lobate, except in one Australian species in which the claws are simply curved; claws not obviously sexually dimorphic.

Forewing with *Rs* weakly sinuate; *2 + 3rm* proximal to *2m–cu*; *1m–cu* and Cu_{1a} basally separate. Hindwing with 12–16 hamuli on vein R_1; distal abscissa of Cu_1 present.

CI = 0·65–1·00; BI = 1·70–1·90; DBI = 0·80–1·05; MI = 1·70–1·95; RI = 1·40–1·70; NI = 0·30–0·55; ICI = 0·60–1·20; PI = 2·20–2·90.

Propodeum reticulate, spiracle about 2·5 times as long as broad; apex of propodeum reaching about 0·5 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 a little longer than apical depth of abdomen; apex of ovipositor elongately constricted, acutely pointed; extreme apex decurved; ovipositor not at all laterally compressed; heavily sclerotized nodus present dorsally (Text-figs 2, 3, 18).

♂ genitalia. Single syntergum present; ninth abdominal sternite almost quadrate, posteriorly rounded; gonosquamae short, usually acute apically. Gonolaciniae distally abruptly angled about 90°; teeth small; apodeme angled about 20° from axis of gonolacinia, long, reaching 0·75 of length of basivolsellar strut. Distivolsella slender, basally less than 0·5 times as wide as long, distally swollen; teeth arranged diagonally across clasping face. Paramere proximally rounded. Aedeagus in profile sinuate, apically weakly bilobate, rather evenly sclerotized but with a more membranous ventral region bearing a few scattered spines on extreme ventral margin; distal end of lateral sclerotized region reaching apex of aedeagus; ventral region not laterally extended (Text-figs 30–33, 52, 70, 122).

A particularly distinctive feature of this genus is the possession by males of flattened hairs on the ventral surface of the second hind tarsus. The function of these presumably sensory appendages is unknown, but the hind legs are used to attract females. The males of this genus display, adopting a very characteristic flight pattern with the hind legs broadly out-stretched so that the explanate and and usually brightly coloured hind tarsi are particularly obvious.

Heteropelma is one of the most easily recognizable genera, but even so, there is some variation of characters previously considered diagnostic of this genus. *H. perornatum* is distinct from other species in having the head strongly narrowed behind the eyes (Text-figs 175, 176) and often the inner mid tibial spur is reduced so that it superficially appears that the tibia is unicalcarate. The shape of the hind tarsal claws has been used by some workers as a diagnostic feature of this genus and indeed the majority of species have the typical strongly geniculate claws. One species, *H. flavitarse*, is characterized by having simply curved hind tarsal claws (Gauld, 1974).

Distribution. This genus has been recorded from all regions except the Neotropical, Nearctic and Ethiopian.

In many areas species of this genus are the most common Anomaloninae observed.

Included species. The following species have been examined:

H. calcator Wesmael, *H. amictum* (F.), *H. acheron* (Morley), *H. elongatum* Uchida, *H. capitatum* (Desvignes), *H. flavitarse* (Brullé), *H. fulvitarse* Cameron, *H. perlongum* Cushman, *H. perniciosum* (Turner), *H. perornatum* (Cameron), *H. reticulatum* Cameron, *H. scaposum* (Morley), *H. fulvicorne* (Cameron) and *H. tinctipenne* (Cameron).

Genus ***TANYPELMA*** Townes

Tanypelma Townes, 1971 : 157. Type-species: *Heteropelma fulvicorne* Townes, 1945 : 729, by original designation.

The name *Tanypelma* attributed by Brischke to Foerster appears as a synonym of *Orthopelma* Taschenberg (Brischke, 1881). There is no evidence that *Tanypelma* Foerster was ever published by Foerster. According to the *International Code of Zoological Nomenclature* names published before 1931 must be accompanied by a description, definition or indication (Article 12) and citation of a name in synonymy does not constitute an indication (Articles 16b; 11d). *Tanypelma* Foerster, Brischke must therefore be disregarded and cannot be cited as a senior homonym of *Tanypelma* Townes.

Eyes without pubescence, inner margins almost parallel sided; occipital carina complete, separated from posterior ocelli by more than 2·0 times ocellar diameter; frons concave without a median vertical carina, lower part of frons with a lamella between antennal bases. Antennae moderately long, those of ♀ without a white band; scape truncate, 1·4 times as long as pedicel; fourth flagellar segment about 1·5 times as long as broad. Clypeus apically convex, without a medio-ventral tooth; mandibles bidentate, lower tooth a little shorter than upper, apices not twisted; labial palpi with four segments; cardo basally lobate. Genal carina reaching base of mandible, remote from hypostomal carina.

Pronotum dorsally long, subvertical, with a broad weak transverse impressed furrow; posterior corner not occluding spiracular sclerite; lower anterior margin of pronotum with a large tooth, lower corner acute to rounded. Anterior of mesoscutum abruptly but not irregularly rounded, without an apical concavity; notauli weak but discernible, extending to centre of mesoscutum; medio-posterior region of mesoscutum coarsely punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina usually reaching above centre of mesopleuron, inclined towards the anterior margin of the pleuron, medio-ventrally not produced into a flange; sternaulus indistinct; posterior transverse carina of the mesosternum complete, not at all interrupted.

Fore coxae smooth, fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two apical spurs. Hind trochanter about equal in length to the trochantellus; ♂ hind tarsi not swollen; hind tarsal claws geniculate, basally lobate, not obviously sexually dimorphic.

Forewing with *Rs* weakly sinuate; *2 + 3rm* proximal to *2m-cu*; *1m-cu* and Cu_{1a} basally separate. Hindwing with 14–18 hamuli on vein R_1; distal abscissa of Cu_1 present.

CI = 0·95–1·05*; BI = 1·80–2·15*; DBI = 0·85–1·00*; MI = 1·50–1·70*; RI = 1·50–1·60*; NI = 0·80–0·90*; ICI = 2·10–2·30*; PI = 1·90–2·20*.

Propodeum reticulate, spiracle about 3·5 times as long as broad; apex of propodeum reaching about 0·5 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 a little longer than apical depth of abdomen; apex of ovipositor constricted; extreme apex shortly acute, not obviously decurved; ovipositor dorsally flattened; heavily sclerotized nodus present dorsally.

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly rounded with a small median impression; gonosquamae rather elongately pointed. Gonolaciniae distally abruptly angled about 90°; teeth reduced to ridge-like projections; apodeme angled about 20° from axis of gonolacinia, long, reaching 0·7 of length of basivolsellar strut. Distivolsella slender, basally about 0·5 times as wide as long, distally weakly swollen, clasping face concave with vertical median ridge weakly sloping away either side, with ventral side covered with teeth. Paramere proximally rounded. Aedeagus in profile sinuate, apically weakly bilobate, very evenly sclerotized, ventrally not laterally extended (Text-figs 55, 75, 121).

This genus is very closely related to *Heteropelma*, from which it differs, in addition to the characters mentioned above, in having the scutellum strongly swollen (that of *Heteropelma* is flat or centrally concave).

DISTRIBUTION. This genus is restricted to the Nearctic region.

INCLUDED SPECIES. The following species have been examined: *T. fulvicorne* Townes and *T. datanae* (Riley).

Genus **ENCARDIA** Tosquinet

Encardia Tosquinet, 1896 : 264. Type-species: *Encardia picta* Tosquinet, 1896 : 264, by monotypy.

Herus Tosquinet, 1903 : 394. Type-species: *Herus sagus* Tosquinet, 1903 : 395 [= *Encardia picta* Tosquinet, 1896 : 264], by monotypy. [Homonym of *Herus* Rehn, 1900.]

Ctenotoma Cameron, 1906 : 127. Type-species: *Ctenotoma fuscipennis* Cameron, 1906 : 128 [= *Encardia picta* Tosquinet, 1896 : 264], by subsequent designation (Viereck, 1914*a* : 39).

Ctenocaloides Fahringer, 1936 : 582. Type-species: *Ctenocaloides anareolatus* Fahringer, 1936 : 582 [= *Encardia picta* Tosquinet, 1896 : 264], by original designation.

Eyes with surface bearing hair, inner margins weakly convergent; occipital carina complete or centrally narrowly interrupted, separated from posterior ocelli by more than 2·0 times ocellar diameter; frons with a median vertical carina. Antennae moderately long, those of ♀ without a white band; scape almost truncate, about 1·3 times as long as pedicel; fourth flagellar segment about 1·5 times as long as broad. Clypeus with apex acute, with a median tooth; mandible bidentate, with wide flange on lower margin, lower tooth about as long as or even slightly longer than upper, not twisted appreciably; mouthparts unusual in being very reduced, labial palps with two segments, maxillary palps (in other genera the maxillary palps are 5-segmented) reduced to a finger-like appendage of one or two segments, if two, then division is not particularly clear; cardo with very weak lobes, membranous. Genal carina joining base of mandible separate from hypostomal carina.

Pronotum dorsally long, subhorizontal, with a broad transverse groove; posterior corner occluding upper 0·2 of spiracular sclerite; lower anterior margin without a tooth, lower corner rounded. Anterior of mesoscutum very evenly rounded, without an apical concavity; notauli present, weakly to strongly impressed to centre of mesoscutum; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina indistinct, when present extending only to level of lower corner of pronotum, medio-ventrally not raised into flange; sternaulus absent; posterior transverse carina of mesosternum usually completely absent.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter about 1·6 times as long as trochantellus, or longer; hind tarsi of ♂ not swollen; hind tarsal claws rather geniculate, not obviously sexually dimorphic.

Forewing with *Rs* almost straight; 2 + 3*rm* slightly proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separate. Hindwing with 10–13 hamuli on vein R_1; distal abscissa of Cu_1 present.

CI = 2·20–2·40; BI = 1·45–1·65; DBI = 0·50–0·64; MI = 1·60–1·90; RI = 2·05–2·37; NI = 1·22–1·43; ICI = 1·90–2·42; PI = 1·70–1·80.

Propodeum anteriorly smooth, posteriorly reticulate, spiracle about 2·5 times as long as broad; apex of propodeum not extended beyond 0·3 of length of hind coxae. Gaster short, not or weakly laterally compressed (the gaster of all other genera is laterally compressed); petiole unusual in being very short with inter-spiracular distance about 0·4 times as long as length of tergite (in most other genera inter-spiracular distance is less than 0·2 of length of tergite).

♀ genitalia. Valvula 3 a little longer than apical abdominal depth; apex of ovipositor abruptly constricted, constricted part about 2·0 times as long as median thickness of rather stout ovipositor, extreme apex weakly decurved, ovipositor not laterally compressed.

♂ genitalia. Syntergites separate; ninth abdominal sternite transverse, posteriorly truncate, very weakly sclerotized; gonosquamae short, truncate. Gonolaciniae distally weakly angled about 30°; teeth large, auxillary teeth present on inner surface; apodeme straight, extending about 0·2 of length of basivolsellar strut. Distivolsella moderately broad, basally about 0·6 times as wide as long; clasping face flat, spines scattered diagonally. Aedeagus in profile apically truncate, medianly strongly geniculate, swollen. Apex evenly sclerotized, except for a laterally weakly extended ventral membranous region (Text-fig. 116).

The shape of the gaster and the coloration make this genus one of the most distinctive amongst the Therionini.

In the collections of the BMNH are two specimens of *E. picta* together with the

Saturniid pupae from which they have emerged. Dissection of these have enabled the structure of the first instar larva and the head capsule of a final instar larva to be examined. One puparium was unusual in containing both the cast skin of a first instar larva and a dehydrated corpse of a second instar larva, showing that oviposition may have occurred twice in the same saturniid larva. Although the entire contents of the puparium had been consumed by the mature *Encardia* larva, it did not eat the other first instar *Encardia* larva.

The structure of the first instar larva is shown in Text-figs 153, 154. No sclerotized cephalic capsule was found to be present. The mandibles were observed to be minute, inserted apically on a stomal papillus. The mandibles were observed to have a pair of obvious spherical condyles which provided points of articulation. The size and positioning of the mandibles would seem to indicate that they are virtually non-functional. The most obvious feature of the larvae is the possession of an elongate caudal appendage. Similar appendages have been observed on the larvae of other species of Therionini, notably *Heteropelma calcator* (Plotnikov, 1914) and *Therion morio* (F.) (Tothill, 1922).

The cephalic capsule of the final instar larva of *E. picta* (Text-fig. 155) is more similar to that of *Heteropelma* species than to any other described species. *Encardia* differs from *Heteropelma* in the arrangement of the labral sensillae. Those of the latter are clustered into two separate groups, whereas those of the former are arranged in a single longitudinal group.

Distribution. Only recorded from Ethiopian region.

Included species. *Encardia* is a small genus which includes only the two species *E. picta* Tosquinet and *E. rufantennata* Benoit, which were examined.

Variation of these species has recently been discussed by Huddleston (1975).

Genus ***GRAVENHORSTIA*** Boie

Gravenhorstia Boie, 1836 : 42.

Eye with or without short pubescence, margins ventrally, at most rather weakly convergent; occipital carina complete, close to posterior ocelli; frons with at most an indistinct median vertical carina. Antennae short to moderately long, those of ♀ without a white band; scape truncate, always longer than pedicel (at least 1·5 usually more than 1·8 of length of pedicel); fourth flagellar segment about 1·4 times as long as broad. Clypeus apically convex to centrally pointed, with or without a median tooth; mandibles bidentate, rarely with a basal lobe, varying from equally bidentate to having lower tooth mutic, apices not or weakly twisted; labial palpi with four segments; cardo with weak lobes. Genal carina usually reaching base of mandible separate from rarely contiguous with hypostomal carina.

Pronotum dorsally long, subhorizontal, with a transverse furrow; posterior corner flat, not covering spiracular sclerite; lower anterior margin of pronotum without a tooth, lower corner acute or rounded. Anterior of mesoscutum smoothly and evenly rounded, apical concavity absent; notauli completely absent; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina usually short, not extending above lower 0·3 of mesopleuron and with upper end distant from the anterior margin of the mesopleuron, medio-ventrally not produced into a flange; sternaulus indistinct; posterior transverse carina of mesosternum interrupted before each mid coxa.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two apical spurs. Hind trochanter less than 1·5 times as long as trochantellus;

hind tarsi of ♂ not explanate; hind tarsal claws very variable in shape, from long and simple to short and pectinate on basal half; those of ♀ always more extensively pectinate, usually though not always shorter and less strongly curved than those of ♂ (Text-figs 215–218).

Forewing with *Rs* sinuate; 2 + 3*rm* distal, opposite or proximal to *2m–cu*; *1m–cu* and Cu_{1a} basally separated. Hindwing with 10–17 hamuli on R_1; distal abscissa of Cu_1 present.

Propodeum reticulate, spiracles more than 1·5 times as long as broad; apex of propodeum at most reaching 0·5 of length of hind coxa. Gaster compact to elongate (PI = 2·20–3·70).

♀ genitalia. Valvula 3 slightly longer than apical abdominal depth; apex of ovipositor constricted, constricted part at least 4·0 times as long as median thickness of ovipositor; extreme apex decurved; ovipositor not obviously laterally compressed (Text-fig. 23).

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse; gonosquamae short, usually truncate. Gonolacinia distally evenly curved about 50°; teeth small to moderate; apodeme straight, extending about 0·4 of length of basivolsellar strut. Distivolsellar moderately to very broad, basally 1·00 times as wide as long; clasping face particularly flat, with a weak peripheral ridge bearing a few teeth (Text-figs 80, 108–111).

For the present this genus is restricted to those Therionini in which the mesoscutum is anteriorly smooth and evenly rounded in profile (Text-figs 204, 209), the claws are strongly sexually dimorphic, those of the male being long and weakly curved whilst those of the female are shorter and more strongly curved (Text-figs 215–218), the notauli entirely absent and the aedeagus apico-ventrally impressed (Text-figs 108–111). This therefore excludes a number of Australian species which, though quite closely related to *Gravenhorstia*, have the mesoscutum anteriorly more abruptly rounded and with impressed notauli. These species have been placed in *Habronyx* (*Austranomalon*).

There has probably been more disagreement about the limits of this genus than about any other in the subfamily. Townes *et al.* (1965) included *Erigorgus* within *Gravenhorstia*, but in later work Townes (1971) treated these as distinct genera. Viktorov (1968) considered that *Gravenhorstia*, together with *Nenethes* and *Aubertia*, should be accorded the status of a separate subtribe, the Gravenhorstiina, as distinct from the Erigorgina. The diagnostic feature of the Gravenhorstiina was considered to be the form of the gaster, notably the fact that the second tergite is subequal to the length of the third. Because of the difference in shape of the gaster basally, Foerster (1868) considered that *G. picta* had more affinity with the Porizontini (Campoplegoidea, in part, sensu Foerster) although in all other features *G. picta* is typically Therionine. A variation in the lengths of the basal segments of the gaster of insects of one subtribe is an occurrence not unknown amongst other groups of Ichneumonids. For example, in the Cremastinae, *Eutanygaster* Cameron and *Eiphosoma* Cresson have the anterior abdominal segments far more elongate than those of the related genus *Cremastus* Gravenhorst. It is therefore considered that it is not justifiable to place *Gravenhorstia*, *Nenethes* and *Aubertia* in a separate subtribe.

Examination of a number of species has shown that there is an almost continuous range of variation in the form of the abdomen (Table 2). It can clearly be seen that there is a tendency towards elongation of the basal abdominal segments from *G. picta* to *G. cerinops*.

Examination of the genitalia of the species of *Gravenhorstia* reveals that there are definite affinities between the species (Text-figs 108–111). The extent of the

TABLE 2

Comparison of the subgenera of *Gravenhorstia*

GRAVENHORSTIA (*GRAVENHORSTIA*)	*GRAVENHORSTIA* (*KOKUJEWIELLA*)	*GRAVENHORSTIA* (*ERIGORGUS*)	*GRAVENHORSTIA* (*RIBASIA*)
Mandible basally simple; teeth subequal in length.	Mandible basally simple; teeth subequal to lower tooth distinctly the shorter.	Mandible basally simple; lower tooth distinctly the shorter, rarely almost absent.	Mandible basally lobate; lower tooth distinctly the shorter.
Clypeus apically rounded with small median tooth.	Clypeus apically rounded with small median tooth.	Clypeus apically pointed, usually with large median apical tooth.	Clypeus apically angularly rounded with blunt median apical tooth.
Scutellum convex.	Scutellum moderately convex.	Scutellum weakly convex to flat.	Scutellum convex.
Gaster short: LAI = 1·4–1·8, DAI = 1·1–1·3.	Gaster moderately long: LAI = 2·2–2·4, DAI = 1·2–1·4.	Gaster elongate: LAI = 2·6–4·6, DAI = 1·4–1·8.	Gaster moderately long: LAI = 3·0, DAI = 1·3.
Lower face with central cornute process, finely punctate.	Lower face without cornute process, finely punctate.	Lower face without cornute process, finely to coarsely punctate.	Lower face flat, coarsely and sparsely punctate.
Aedeagus with two lobules near apico-ventral impression; ventral membranous area with isolated spinules.	Aedeagus with a single lobule near apico-ventral impression; ventral membranous area with scattered spinules.	Aedeagus without lobes near apico-ventral impression; ventral membranous area moderately spinose.	Unknown.

apico-dorsal extension increases from *G. picta* to species traditionally placed within *Erigorgus*. In *G. picta* there are two processes at the anterior and ventral corners of the apicoventral impression and the ventral membranous area is evenly tapered. In *G. iberus* there is a single process on the ventral corner of the apicoventral impression and the ventral membranous area is short and broad. In species traditionally placed within *Erigorgus* there are no processes present.

There is an extraordinary degree of variation in the shape of the mandibles within this genus. In *G. picta* the mandibles are almost equally bidentate, in *G. ibera* the mandibular teeth are subequal, in *G. vicaria* the mandible is narrowed and with a basal flange, and in species traditionally placed within *Erigorgus*, the lower mandibular tooth is much smaller than the upper. In some undescribed species the lower mandibular tooth is almost entirely absent. In *G. erythrogaster* the mandible bears a large and singularly characteristic basal lobe (Text-fig. 157).

The larvae of this genus were examined by Beirne (1941) but no illustration or description of the cephalic capsule of the final instar larva is available. These structures have been examined for a number of species traditionally referable to *Erigorgus*. The cephalic capsules of all species examined were found to be similar to *Aphanistes* but without the posterior ends of the hypostomae extending to a point. In at least some species a minute vestige of the hypostomal spur was observed to be present (Text-fig. 147).

It can be seen from Table 2 that *Gravenhorstia* can be subdivided into four species-groups. It is suggested that these species-groups be treated as subgenera within the genus *Gravenhorstia*.

Subgenus ***GRAVENHORSTIA*** Boie

Gravenhorstia Boie, 1836 : 42. Type-species: *Gravenhorstia picta* Boie, 1836 : 43, by monotypy.

Odontopsis Foerster, 1868 : 150. Type-species: *Gravenhorstia picta* Boie, 1836 : 43 (included by Dalla Torre, 1901 : 200), by subsequent monotypy.

Surface of eye glabrous; lower face with a prominent median tubercle. Clypeus rounded with a median apical tooth; mandible equally bidentate, without a basal flange. Genal carina reaching base of mandible separate from hypostomal carina.

Mesoscutum evenly rounded, without any trace of notauli; scutellum strongly convex. Epicnemial carina indistinct, reaching to about the centre of the mesopleuron, its upper end widely separated from the anterior margin of the mesopleuron. Propodeum short, posteriorly extended about 0·45 of length of hind coxae.

Foreleg with basitarsus of ♂ at least 2·0 times as long as fifth tarsal segment; first subdiscal cell explanate; 14–17 hamuli on vein R_1; 2 + 3*rm* proximal, opposite or distal to 2*m–cu*.

CI = 1·10–1·65; BI = 1·75–2·10; DBI = 0·55–0·65; MI = 1·80–2·00; RI = 1·25–1·75; NI = 0·85–1·05; ICI = 1·40+.

♂ genitalia. Aedeagus in profile medianly angled, apicodorsally with a lobe, dorsally concave; apicodorsal lobe dorsally membranous, membrane extended proximally to angulation, and with a small ventrally directed membranous lobule; ventral membranous area discrete, bearing few spinules, produced apically into small upturned prominence, not laterally extended (Text-fig. 111).

Previous workers have often regarded this as a primitive species-group on account of the form of the gaster. The present author regards this as a more evolved, specialized insect than G. (*Erigorgus*) *cerinops*. Evidence for this suggestion has been obtained from dissection of the female. The ovipositor is terminally markedly constricted, a feature presumably evolved to facilitate oviposition into early instar host larvae, but unlike other Therionini which have a very small egg (0·4 mm or less in length, even for a large species) *G. picta* has large eggs (0·8 mm or more). Although nothing is known about the biology of these insects, the size of the egg would seem to indicate that the insect oviposits in later instar larvae and, because of the form of the ovipositor, it is conceivable that this is a secondary reversion to a more usual habit and not a primary adaptation. It may well be that increase in depth and decrease in length of the basal segments of the gaster may be an adaptation to enclose the relatively larger muscles needed by this insect to support its heavier ovaries.

DISTRIBUTION. This subgenus is confined to the Mediterranean region.

INCLUDED SPECIES. Only one described species, *Gravenhorstia* (*Gravenhorstia*) *picta* Boie, is referable to this subgenus. Two females in the collections of the Hope Department of Entomology, Oxford, may represent a second species or it may be that these females are a rather smaller colour variant of *picta*.

Subgenus ***KOKUJEWIELLA*** Shestakov **stat. n.**

Kokujewiella Shestakov, 1926 : 257. Type-species: *Kokujewiella vicaria* Shestakov, 1926 : 258, by monotypy.

Nenethes Ceballos, 1957 : 8. Type-species: *Nenethes iberus* Ceballos, 1957 : 9, by monotypy. **Syn. n.**

Surface of the eye with short pubescence; lower face flat. Clypeus apically rounded, marginate, with at the most an indistinct median tooth; mandible from subequally bidentate to, with lower tooth distinctly the shorter, sometimes rather narrow, with at most a small basal flange. Genal carina reaching base of mandible and separate from hypostomal carina.

Mesoscutum evenly rounded, without any discernible trace of notauli; scutellum convex. Epicnemial carina indistinct, not reaching above 0·4 of mesopleuron, and with upper end distant from anterior margin of mesopleuron. Propodeum moderately short, posteriorly extended 0·5 of length of hind coxae.

Foreleg with basitarsus of ♂ (at least in *G. iberus*) almost equal in length with the fifth tarsal segment; first subdiscal cell explanate; 11–13 hamuli on vein R_1; 2 + 3*rm* proximal to 2*m–cu*. CI = 1·05–1·35; BI = 1·65–2·00; DBI = 0·55–0·67; MI = 1·70–1·90; RI = 1·50–1·75; NI = 0·60–0·70; ICI = 2·40–4·50.

♂ genitalia. Aedeagus in profile medianly angled with large apicodorsal lobe, dorsally concave weakly; apicodorsal lobe dorsally membranous, membrane extending proximally to angulation; ventral membranous area weakly spinose, the anterior region produced into a small prominence which curves forward and up; ventral region not laterally extended (Text-fig. 110).

In most characters this subgenus is intermediate between G. (*Gravenhorstia*) and G. (*Erigorgus*).

DISTRIBUTION. Species of this subgenus are distributed throughout the Mediterranean region and Central Asia, approximately between 35°N and 45°N.

Included species. Two described species have been found to belong to this subgenus: *G.* (*Kokujewiella*) *vicaria* (Shestakov) and *G.* (*Kokujewiella*) *ibera* (Ceballos).

Subgenus ***ERIGORGUS*** Foerster **stat. n.**

Erigorgus Foerster, 1868 : 146. Type-species: *Anomalon fibulator* Gravenhorst, 1829 : 681, by subsequent designation (Perkins, 1962 : 422).

Sympratris Foerster, 1868 : 146. Type-species: *Anomalon ferrugineus* Norton, 1863 : 363 (included by Viereck, 1917 : 285), by subsequent monotypy.

Paranomalon Viereck, 1912*b* : 175. Type-species: *Ophion flavifrons* Gravenhorst, 1829 : 1088, by original designation.

Surface of eye glabrous; lower face flat. Clypeus rounded or centrally pointed, with or rarely without a median apical tooth; mandible with upper tooth distinctly the longer, basally with at most a minute swelling. Genal carina reaching mandible at same point as hypostomal carina.

Mesoscutum evenly rounded without any trace of notauli; scutellum weakly convex or deplanate. Epicnemial carina very short, usually not extending above lower corner of pronotum, upper end distant from anterior margin of mesopleuron. Propodeum quite short, posteriorly extended 0·45–0·55 of length of hind coxae.

Foreleg with basitarsus of ♂ at least 2·0 times as long as fifth tarsal segment; first subdiscal cell explanate; 10–14 hamuli on R_1; 2 + 3*rm* proximal or opposite *2m–cu*.

CI = 1·00–2·00; BI = 1·40–2·15; DBI = 0·50–0·66; MI = 1·30–2·00; RI = 1·30–1·98; NI = 0·80–1·55; ICI = 2·50+.

♂ genitalia. Aedeagus in profile medianly angled apically with a large dorsal lobe, dorsally concave; apicodorsal lobe membranous, ventral spinose membranous area present; aedeagus laterally almost evenly sclerotized; ventral region not laterally extended (Text-figs 108, 109).

This subgenus has been interpreted quite differently by various authors. Schmiedeknecht (1936) included a number of species, all of which have been found to be congeneric with the type-species, but excluded species of the *Anomalon cerinops*-group (*Paranomalon*). These he placed in the genus *Anomalon* (sensu Jurine). The distinction between these two groups was considered to be the position of vein 2 + 3*rm* in relation to *2m–cu*. Amongst the former group these veins were described as 'being continuous', whilst in the latter group *2m–cu* was said to be 'beyond' the cubital cross vein (2 + 3*rm*). No further differences have been found between the two groups, and as the position of vein 2 + 3*rm* is a particularly variable character, it is suggested that the *A. cerinops* group should not be accorded higher taxonomic distinction and be included within the subgenus *Erigorgus*.

Distribution. This subgenus is recorded from all regions except the Ethiopian.

Included species. This subgenus contains the majority of the described species of *Gravenhorstia*. The following have been examined:

Gravenhorstia (*Erigorgus*) *barbarica* (Morley), *G.* (*Erigorgus*) *cerinops* (Gravenhorst), *G.* (*Erigorgus*) *coreensis* (Uchida), *G.* (*Erigorgus*) *fibulator* (Gravenhorst), *G.* (*Erigorgus*) *melanops* (Foerster), *G.* (*Erigorgus*) *melanobata* (Gravenhorst), *G.* (*Erigorgus*) *ruficornis* (Szépligeti), *G.* (*Erigorgus*) *similis* (Szépligeti), *G.* (*Erigorgus*) *villosa* (Gravenhorst), *G.* (*Erigorgus*) *erythrocera* (Cameron), *G.* (*Erigorgus*) *interstitialis* (Cameron), *G.* (*Erigorgus*) *pilosella* (Cameron), *G.* (*Erigorgus*) *variornata*

(Cameron), *G.* (*Erigorgus*) *buccata* (Morley), *G.* (*Erigorgus*) *sonorensis* (Cameron) and *G.* (*Erigorgus*) *nigrita* (Norton) **comb. n.**

Subgenus ***RIBASIA*** Ceballos **stat. n.**

Ribasia Ceballos, 1921 : 49. Type-species: *Ribasia erythrogaster* Ceballos, 1921 : 49, by original designation.

Eye surface glabrous; lower face flat, coarsely punctate. Clypeus medianly pointed, without a median apical tooth; mandible slender, lower tooth much shorter than upper, with a conspicuous basal flange. Genal carina reaching base of mandible separate from hypostomal carina.

Mesoscutum evenly rounded, without any trace of notauli; scutellum strongly convex. Epicnemial carina indistinct, reaching a little above the lower corner of the pronotum, its upper end widely separated from the anterior margin of the mesopleuron. Propodeum quite short, posteriorly extended to reach 0·4 of length of hind coxae.

Foreleg with basitarsus of ♂ more than 3·0 times as long as fifth tarsal segment; first subdiscal cell explanate; 12 hamuli on vein R_1; 2 + 3*rm* distal to 2*m–cu*.

CI = 1·25; BI = 1·65; DBI = 0·57; MI = 1·85; RI = 1·42; NI = 0·55; ICI = 3·00.

♂ genitalia. It has not been possible to examine the genitalia of this subgenus as only two specimens are known.

Apart from the form of the clypeus and mandibles this species is closely related to *G.* (*Gravenhorstia*) and *G.* (*Kokujewiella*). In *G.* (*Kokujewiella*) *vicaria* the mandibles are very similar to *G.* (*Ribasia*) *erythrogaster* except that the basal lobe in the former species is considerably smaller.

Distribution. This subgenus is recorded only from Spain.

Included species. Only the type-species *G.* (*Ribasia*) *erythrogaster* is known to belong to this genus.

The three subgenera *Gravenhorstia*, *Kokujewiella* and *Ribasia* collectively contain only four species, three of which are known from relatively few specimens. These subgenera appear to be mainly Mediterranean, but as this area is comparatively well worked entomologically and these species are taken so very rarely it is possible that this region represents the periphery of their range. Evidence for this in one species may be deduced from the following data.

G. (*Kokujewiella*) *ibera* (Ceballos): 1 ♂ Spain, 1 ♂ Israel, 3 ♀, 2 ♂ Turkey and 6 ♀, 5 ♂ southern U.S.S.R. (these figures represent the total known specimens to date). It is apparent that this species is more common in eastern districts and it is possible that the centre of distribution of these subgenera could be Central Asia. Until the fauna of this region is more fully known it is convenient to treat these groups as separate subgenera, but it is possible that the subgenera *Kokujewiella* and *Ribasia* may one day be included within the subgenus *Gravenhorstia*.

Genus ***AUBERTIANA*** Viktorov

Aubertia Viktorov, 1968 : 910. Type-species: *Romanella unidentator* Aubert, 1964 : 35, by original designation. [Homonym of *Aubertia* Oberthür, 1896.]

Aubertiana Viktorov, 1970 : 308. [Replacement name for Aubertia Viktorov.]

Eye without pubescence, margins ventrally parallel; occipital carina complete, close to posterior ocelli; frons without a median vertical carina. Antennae short, scape truncate, rather globose, 2·0 times as long as pedicel. Clypeus apically concave, without a median tooth; mandibles unidentate; labial palpi with four segments. Genal carina reaching base of mandible separate from hypostomal carina.

Pronotum dorsally long, subhorizontal, with transverse furrow; posterior corner flat, not covering spiracular sclerite; lower anterior margin of pronotum without a tooth, lower corner acute. Anterior of mesoscutum almost evenly rounded, but with a longitudinal concavity just before anterior margin; notauli absent; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina short, not extending above the lower corner of the pronotum, its upper end distant from anterior margin of mesopleuron, medio-ventrally not produced into a flange; sternaulus indistinct; posterior transverse carina of mesosternum broadly absent before each mid coxa.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two apical spurs. Hind trochanter about 1·5 times as long as trochantellus; hind tarsi of ♂ not explanate; hind tarsal claws curved, pectinate to apices.

Forewing with *Rs* weakly bowed; 2 + 3*rm* opposite 2*m–cu*; 1*m–cu* and Cu_{1a} basally separated. Hindwing with 13 hamuli on R_1; distal abscissa of Cu_1 present.

CI = 1·15*; BI = 1·90*; DBI = 0·60*; MI = 2·00*; RI = 1·60*; NI = 1·10*; ICI = 6·00*.

Propodeum reticulate, spiracles more than 4·5 times as long as broad; apex of propodeum reaching 0·3 of length of hind coxae; gaster compact (DAI = 1·30; LAI = 2·30).

♀ unknown.

♂ genitalia. Insufficient material available for dissection.

This genus appears to be closely related to the subgenus *Gravenhorstia* from which it differs principally in the form of the clypeus and mandibles. Clypeomandibular variation is particularly common within the genus *Gravenhorstia* and it is possible that this species may better be placed within it. However, two features of this species are not found in *Gravenhorstia*. The hind tarsal claws of the holotype (♂) are pectinate to the apices, unlike males of *Gravenhorstia* which have the hind tarsal claws long and simple. The anterior of the mesoscutum has a very characteristic longitudinal depression or concavity immediately behind the anterior margin. A similar concavity has not been observed in *Gravenhorstia* species, therefore *Aubertiana* is retained as a separate genus next to *Gravenhorstia*.

DISTRIBUTION. This genus is found in the North African region.

INCLUDED SPECIES. Only the type-species, *A. unidentator* (Aubert), is at present referable to this genus.

Genus *ATROMETOIDES* Fahringer

Atrometoides Fahringer, 1922 : 7. Type-species: *Atrometoides winkleri* Fahringer, 1922 : 8, by monotypy.

Romanella Meyer, 1935 : 114. Type-species: *Romanella maracandica* Meyer, 1935 : 115, by monotypy.

Nothing further can at present be added to the descriptions of this genus included by Townes (1971).

It would appear that this genus is closely related to *Aubertia*, and to the subgenus *G.* (*Kokujewiella*).

Genus *PORIZONOPTERON* Meyer

Porizonopteron Meyer, 1931 : 7. Type-species: *Porizonopteron schestakovi* Meyer, 1931 : 7, by monotypy.

Eye with surface glabrous; inner margins subparallel; occipital carina complete, close to posterior ocelli; frons with a median vertical carina. Antenna very short, ♀ without a white band; scape truncate, about 1·3 times as long as pedicel; fourth flagellar segment 1·2 times as long as broad. Clypeus with a weak median apical tooth; mandibles with lower tooth vestigial or absent. Genal carina joining base of mandible at same point as hypostomal carina.

Pronotum dorsally of moderate length, subhorizontal, without a transverse furrow, posterior corner not covering spiracular sclerite; lower anterior margin without a tooth, lower corner truncate. Anterior of mesoscutum abruptly rounded, apically flattened; notauli absent; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina with upper end reaching posterior margin of pronotum just below middle of mesopleuron, medioventrally not raised; sternaulus absent; posterior transverse carina of mesosternum interrupted before each mid coxa.

Fore coxae smooth; fore tibial spur rather long, with sparsely distributed macrotrichia on inner surface. Mid tibia bicalcarate. Hind trochanter subequal in length to a ventrally flattened trochantellus; hind tibia laterally compressed, hind basitarsus with a laterally compressed postero-dorsal prolongation (Text-fig. 251); hind tarsal claws of ♂ weakly curved, simple.

Forewing with *Rs* more or less straight; *2 + 3rm* proximal to *2m-cu*; *1m-cu* and Cu_{1a} basally separate. Hind wing with seven hamuli on vein *R1*; distal abscissa of Cu_1 present, faint, not reaching margin of wing.

CI = 0·75*; BI = 1·30*; DBI = 0·70*; MI = 1·40*; RI = 2·20*; ICI = 0·40*; NI = 1·80*.

Propodeum weakly coriaceous, spiracle about 4 times as long as broad; apex of propodeum extended 0·8 of length of hind coxa. Gaster elongate.

♂ genitalia. Aedeagus in profile apically swollen, truncate, with dorsal membranous area extended anteriorly, and with extensive ventral membranous area bearing weak spines (Text-fig. 252).

The holotype and only known specimen of *P. schestakovi* has been destroyed. A second species *P. metatarsator* Shaumar, 1966 (= *Anomalon paradoxum* Schmiedeknecht, 1900, junior primary homonym of *A. paradoxum* Brauns, 1895) is represented in the collections of the BMNH by a single ♂, from which the above description is made.

P. schestakovi, as figured by Meyer (1931: fig. 2), has the basitarsus intermediate in form between *P. metatarsator* and species of *Barylypa*. Apart from the form of the hind legs and differences in the aedeagus both species are similar to some species of *Barylypa*.

DISTRIBUTION. Species of this genus are recorded from arid regions, *P. schestakovi* from southern U.S.S.R., *P. metatarsator* from Egypt, Algeria (Oran) and Saudi Arabia.

INCLUDED SPECIES. *P. schestakovi* Meyer and *P. metatarsator* Shaumar.

Genus *TRICHOMMA* Wesmael

Trichomma Wesmael, 1849 : 119. Type-species: *Anomalon* (*Trichomma*) *fulvidens* Wesmael, 1849 : 139, by monotypy.

Trichomella Szépligeti, 1910 : 91. Type-species: *Trichomma clavipes* Krieger, 1904 : 166, by subsequent designation (Viereck, 1914*a* : 148).

Eye with surface elongately and densely hirsute, the hairs longer than their distance apart basally; inner margins very strongly convergent ventrally; occipital carina complete, close to posterior ocelli; frons without a median vertical carina or lamella (except in one western Palaearctic species). Antennae moderately long, ♀ without white bands; scape truncate, about 1·1 times as long as pedicel; fourth flagellar segment about 3·0 times as long as broad. Clypeus with apex medianly pointed, rarely truncate, always with at least a small apical tooth centrally; mandibles bidentate, not twisted, lower tooth slightly shorter than upper tooth; labial palpi with three, rarely four segments, cardo basally lobate. Genal carina joining base of mandible sometimes meeting hypostomal carina at same point.

Pronotum dorsally long, subvertical, without a transverse furrow, posterior corner not covering spiracular sclerite; lower anterior margin without a tooth but with a blunt tubercle at base of epomia, lower corner truncate. Anterior of mesoscutum abruptly rounded without an apical concavity; notauli variable, usually quite strongly impressed past the centre of mesoscutum, but in some species indistinct or absent; medio-posterior region of mesoscutum usually somewhat rugose; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina reaching to or just below centre of mesopleuron, its upper end reaching anterior margin of mesopleuron, medio-ventrally not or weakly raised; sternaulus absent; posterior transverse carina of mesosternum usually interrupted in front of each mid coxa, rarely complete.

Fore coxae smooth, but rather angular; fore tibial spur with a very few acuminate macrotrichia on inner surface. Mid tibia with two spurs. Hind trochanter more than 2·0 (often more than 3·0) times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws curved, pectinate to or beyond centre, not obviously sexually dimorphic.

Forewing with *Rs* weakly sinuate to almost straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separate. Hind wing with 6–10 hamuli on vein R_1; distal abscissa of Cu_1 absent, or in large species with vein represented by a stub and an area of pigmentation in wing membrane, or rarely as a distinct vein, but not joining *cua*, extremely rarely present and continuous.

CI = 0·40–1·03; BI = 1·20–1·55; DBI = 0·60–0·79; MI = 1·42–2·12; RI = 0·85–1·40; ICI = 0·90–5·00; PI = 1·64–2·75.

Propodeum reticulate, spiracle subcircular to 2·0 times as long as broad; apex of propodeum not extended beyond 0·5 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 from 1·0–2·3 times as long as tergite 3; apex of ovipositor abruptly constricted, constricted part about 5·0 times as long as median thickness of ovipositor; extreme apex decurved; ovipositor not at all laterally compressed; nodus distinct, raised and heavily sclerotized (Text-fig. 20).

♂ genitalia. Single syntergum present; ninth abdominal sternite quadrate, posterior margin with a median impression; gonosquamae short, truncate; gonolaciniae distally abruptly angled about 95°; teeth reduced to ridges; apodeme straight, extending about 0·5 of length of basivolsellar strut or 0·8 of length of basivolsellar strut in Australian species. Distivolsella slender, basally 0·3 times as wide as long; clasping face centrally swollen, swelling bearing elongate spines. Paramere proximally swollen apically, impressed. Aedeagus in profile swollen, distal apex impressed, dorsally convex, very membranous; extreme distal apex bearing spines; ventral surface covered with minute spinules, not laterally extended (Text-figs 56, 65, 92, 130, 131).

One of the most characteristic features of this genus is the possession of long hairs on the surface of the eyes. Investigation of the surface of the compound eye has shown it to be composed of many small, almost rectangular facets, with broad undifferentiated interfacetal cuticular areas which bear the elongate pubescence. Most other genera in this subfamily have the more usual arrangement of hexagonal facets with small interfacetal cuticular areas. Only in a few species are the compound eyes obviously hairy and in these species the pubescence is shorter and sparser than that of *Trichomma*. The reduction in the visual surface of the compound eye of *Trichomma* may be the result of a difference in the host preference between this species and other Therionini (the biology of many species is unfortunately unknown at present). *Trichomma* species are frequently found as parasites of fruit-mining lepidopterous larvae (Rosenberg, 1934) whereas all other well known Therionini are parasitic upon free living lepidopterous larvae. It is therefore conceivable that the adult *Trichomma* may rely less on vision to locate a prospective host than do other Therionids. Alternatively the hairs on the eyes may serve to protect the eye surface. Similar elongate hairs on the eye surface of Asilidae have been described by Oldroyd (1964) as providing protection against prey damage. There is, however, no observed occurrence in the life history of the adult *Trichomma* to account for why the eye surface should need more protection than that of any other Therionini.

The form of the male genitalia of this genus at first appeared to be quite unlike that of any other genus. Further study of many species from widely separated regions revealed that there are undoubted affinities between this genus and *Heteropelma* and *Tanypelma*. In the majority of *Trichomma* species the distivolsellae have long spines arranged centrally on a raised hump, but in the Australian species, *T. elegantulum*, there are long spines arranged on a somewhat 'lopsided' hump (Text-fig. 92) and a few shorter spines proximally positioned. This type of distivolsella is intermediate in structure between that of *Heteropelma* and typical *Trichomma*. There is also a marked resemblance between the gonolaciniae of *Trichomma* and *Tanypelma*. The gonolacinia of *Trichomma elegantulum* cannot be distinguished from that of *Tanypelma datanae* as both have abruptly angled apices with teeth reduced to ridges and elongate apodemes (Text-fig. 55). There is also a resemblance between the aedeagal apices of species belonging to these three genera.

Short (1959 : 506) mentions that Dr Perkins had directed his attention to two reared specimens of *T. occisor*, in the collections of the BMNH, with quite a well developed cocoon. Anomaloninae are generally considered not to make a cocoon and these examples of a species of *Trichomma* spinning a cocoon are unique. The cocoons have been opened at some date and the contents removed although there is no indication on the specimens as to who did this examination or where the contents could be. Examination of the BMNH slide collections has revealed that there is a single slide bearing the label '*Trichomma occisor* B.M. coll' and underneath '? Campoplegid' in different ink and written with a different pen, though probably by the same person. The larval cephalic capsule on the slide is not an Anomalonid as the hypostomal spurs are present and very long, the epistomal arch is centrally absent, and there is a Y-shaped prelabral sclerite discernible. The cephalic capsule on this slide is thought to be that of the final instar larva of *Charops* species. Normally *Charops* species make a distinctive black and white cocoon, but occasionally specimens have been found to emerge from unicolorous brown cocoons, similar to those appended to the specimens of *T. occisor*. If the specimen on the slide was extracted from the cocoon appended to *T. occisor* then undoubtedly these are not cocoons from which the specimens of *T. occisor* emerged. Further evidence is needed before it can be accepted that any Anomaloninae larvae construct cocoons.

The immature stages of *Trichomma* are far more similar to those of the 'Theriine' genera than they are to most other genera. The eggs of *Trichomma* are lamp-shaped, like those of *Therion*, *Heteropelma*, *Tanypelma* and *Habronyx* (Text-figs 96–98). The final instar larvae of *Trichomma* have the cephalic capsule with a short hypostoma, approximately as long as the breadth of the mandibular base, similar to that of *Therion* (Text-figs 143, 145). The cephalic capsule of *Trichomma* differs from those of other known genera in having the stipital sclerite weakly bifurcate.

Although *Trichomma* adults are morphologically very unlike the 'Theriine' genera it is difficult to explain the similarities between these genera observed in the immature stages and genitalia structure other than by assuming that there is a definite phylogenic affinity.

DISTRIBUTION. This is a cosmopolitan genus but species constitute a more noticeable part of the Anomalonine fauna in the Indo-Papuan and Australian regions where species have been reared from the pupae of a variety of economically important Lepidoptera.

INCLUDED SPECIES. The following species were examined:

T. fulvidens Wesmael, *T. occisor* Habermehl, *T. enecator* (Rossi), *T. intermedium* Krieger, *T. biroi* (Szépligeti), *T. clavipes* Krieger, *T. decorum* (Cameron), *T. elegantulum* Turner, *T. insularis* Szépligeti, *T. nigricans* Cameron, *T. albicoxum* Morley and at least six further undescribed species.

Genus *AGRYPON* Foerster

Agrypon Foerster, 1860 : 151. Type-species: *Ophion flaveolatus* Gravenhorst, 1807 : 268, by subsequent designation (Morley, 1913 : 424).

[*Labrorychus* Foerster, 1868 : 146, sensu auct. Misidentification.]

Trichonotus Cameron, 1905*a* : 124. Type-species: *Trichonotus reticulatus* Cameron, 1905*a* : 124, by monotypy. [Homonym of *Trichonotus* Schneider, 1801.] **Syn. n.**

Trichionotus Cameron, 1905*b* : 168. Type-species: *Trichionotus reticulatus* Cameron, 1905*b* : 168 [= *Trichonotus reticulatus* Cameron, 1905*a* : 124], by monotypy. **Syn. n.**

Odontagrypon Cameron, 1906 : 90. Type-species: *Odontagrypon spilonotus* Cameron, 1906 : 91, by monotypy.

Paragrypon Uchida, 1941 : 159. Type-species: *Gongropelma kikuchii* Uchida, 1928 : 258, by original designation. **Syn. n.**

Dioborus Rao, 1953 : 204. Type-species: *Dioborus indica* Rao, 1953 : 204 [= *Agrypon nox* Morley, 1913*a* : 91], by original designation. **Syn. n.**

Eye with surface glabrous, margins weakly to strongly convergent ventrally; occipital carina usually present, close to posterior ocelli; frons with or without a median vertical carina. Antennae short to very long, those of ♀ without a white band; scape truncate, at least 1·3 times longer than pedicel; fourth flagellar segment about 3·0 times as long as broad. Clypeus with apex pointed centrally, with a single median tooth; mandibles apically bidentate, lower tooth distinctly the shorter, apices not twisted (except in a few Palaeotropical species which have the apices strongly twisted 70°); labial palpi with three or four segments; cardo basally lobate. Genal carina joining base of mandible.

Pronotum dorsally long, subvertical, with or without a weak transverse furrow, posterior corner at most occluding 0·5 of spiracular sclerite; lower anterior margin without a tooth, lower corner truncate. Anterior of mesoscutum abruptly rounded without an apical concavity; notauli variable, usually strongly impressed, rarely absent entirely; medio-posterior region of mesoscutum punctate, coriaceous or rugose; transverse suture of mesoscutum usually absent, in a few species present except laterally, very rarely complete; transverse furrows present or absent. Epicnemial carina various, usually present, reaching above lower corner of pronotum and parallel to the anterior margin of the mesopleuron; epicnemial carina medio-ventrally weakly produced, in some species strongly raised into a lamella; posterior transverse carina of mesosternum either interrupted in front of each mid coxa or complete.

Fore coxae either smooth or with a carina on anterior or anterio-medial surfaces, rarely with the carina present as discontinuous flecks or very weakly impressed; fore tibial spur with numerous subacute macrotrichia on inner surface. Mid tibia with two spurs. Hind trochanter about 1·2 times as long as trochantellus; hind tarsi of ♂ not or weakly swollen; hind tarsal claws curved, pectinate to about centre, not obviously sexually dimorphic.

Forewing with vein *Rs* almost straight; 2 + 3*rm* proximal to *2m–cu*; 1*m–cu* and Cu_{1a} basally separated from each other but usually very close together. Hindwing with 9–12 hamuli on vein R_1; distal abscissa of Cu_1 present or absent.

CI = 0·15–0·60; BI = 1·20+; DBI = 0·50–0·65; MI = 1·40–1·80; RI = 0·95–1·35; ICI = 1·30–3·70.

Propodeum reticulate, spiracles very variable in shape; apex of propodeum reaching about 0·5 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 from a little longer than apical abdominal depth to 1·2 times as long as tergite 3; ovipositor abruptly constricted, elongately pointed; extreme apex decurved; ovipositor a little compressed laterally (Text-fig. 26).

♂ genitalia. Single syntergum usually present, rarely with separate syntergites; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short, truncate. Gonolaciniae distally abruptly angled about 70°; teeth small; apodeme approximately straight, reaching about 0·5 of length of basivolsellar strut. Distivolsella moderately slender, basally 0·55 times as wide as long; clasping face concave with a diagonal ridge bearing teeth. Paramere proximally acutely pointed. Aedeagus in profile variable, usually apically expanded with distal apex truncate, with or without a small protruberance, dorsally flat or slightly convex, or rarely weakly concave, very membranous; ventral region laterally produced, weakly to very strongly; lateral sclerotized area not or just reaching apex, always angled downwards near tip (Text-figs 90, 129).

Previously this genus has been interpreted in different ways. Some authors (Schmiedeknecht, 1936; Morley, 1915; etc.) did not consider the fore coxal carina an important feature but divided the species now placed in this genus between *Labrorychus* sensu auct. and *Agrypon* solely on whether or not the distal abscissa of Cu_1 was present (a character which has been found to be very variable, even within a single population). Townes (1971) included *Labrorychus* sensu auct. and most of *Agrypon* sensu classical authors within *Trichionotus*. The only constant feature permitting separation of *Trichionotus* from *Agrypon* s. str. is the form of the fore coxae. A short series of specimens of an undescribed species from New Guinea in the collections of the BMNH show variation in the form of the fore coxa, with the carina more discernible in the female and entirely absent in some males. In some specimens from SE. Asia the fore coxal carinae are discontinuous, very weak or present only apically. It is apparent that all species are better included within a single genus as suggested above.

This is a very large genus, with a considerable range of variation between the species. A number of species may be outstanding in having one obviously unusual feature (such as smooth fore coxae or apically twisted mandibles) but it is not concomitant with the classification of the group as a whole to accord these species higher taxonomic status at present.

Distribution. This genus is cosmopolitan, but is particularly numerous both in species and in numbers of individuals in the Palaearctic region. Species are less common in the Australian and Papuan regions where they tend to be replaced in part by *Trichomma* species and *Perisphincter* species respectively.

Included species. The following species have been found to be referable to this genus:

A. flaveolatum (Gravenhorst), *A. anxium* (Wesmael), *A. brevicolle* (Wesmael), *A. clandestinum* (Gravenhorst), *A. debilis* (Wesmael), *A. elongatus* Uchida, *A. flavifrons* (Smith), *A. flexorius* (Thunberg), *A. hilare* (Tosquinet), *A. polyxenae* (Szépligeti), *A. stenostigma* Thomson, *A. suzukii* (Matsumura), *A. tenuicorne* (Gravenhorst), *A. varitarsum* (Wesmael), *A. anomelas* (Gravenhorst), *A. coarctatum* (Brullé), *A. dozense* Cheesman, *A. falcator* (Smith), *A. ferrugineum* Morley, *A. fuscicorne* (Cameron), *A. indicum* Szépligeti, *A. nigricans* Szépligeti, *A. nox* Morley, *A. omabense* Cheesman, *A. productor* (Morley), *A. reticulatum* (Cameron), *A. agnatum* (Cresson), *A. albiditarsum* Morley, *A. flaviceps* Cameron, *A. lineiger* Morley, *A. postscutellare* Morley, *A. residuum* Cresson, *A. ruficaudatum* Morley, *A. africanum* (Morley), *A. primum* Morley, *A. secundum* Morley, *A. spilonotum* (Cameron), *A. delarvatum* (Gravenhorst) **comb. n.**, *A. minutum* Bridgman **stat. rev.** and a large number undescribed.

Genus ***PERISPHINCTER*** Townes

Perisphincter Townes, 1961 : 474. Type-species: *Agrypon tisiphone* Morley, 1913*a* : 92, by original designation.

Eye without pubesence, moderately convergent ventrally; occipital carina complete, close to posterior ocelli; frons without a median vertical carina. Antennae moderately long to long, those of ♀ without a white band; scape truncate, 2·0 times as long as pedicel; fourth flagellar segment about 3·5 times as long as broad. Apex of clypeus with or without a median apical tooth, sometimes with a pair of weak lateral teeth, sometimes simply convex; mandibles bidentate, lower tooth distinctly the shorter, apices not twisted; labial palpi with three segments; cardo basally lobate. Genal carina reaching base of mandible.

Pronotum dorsally of moderate length, subvertical, with a transverse furrow that is centrally obsolescent; posterior corner not occluding spiracular sclerite; lower anterior margin without a tooth, lower corner truncate. Mesoscutum anteriorly abruptly rounded, without a concavity; notauli represented by rugose area; medio-posterior region of mesoscutum rugose; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina reaching to centre of mesopleuron, upper end reaching anterior margin of mesopleuron; epicnemial carina medio-ventrally weakly raised into flange; sternaulus indistinct; posterior transverse carina of mesosternum complete.

Fore coxae encircled by a carina, on the outer side with the carina present above the trochanteral socket; fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two spurs. Hind trochanter about 1·2 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws short, curved and pectinate almost to apices, not obviously sexually dimorphic.

Forewing with vein *Rs* almost straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separated from each other, but usually very close together. Hindwing with 7–9 hamuli on vein R_1; distal abscissa of Cu_1 absent.

CI = 0·10–0·25*; BI = 1·25–1·40*; DBI = 0·60–0·75*; MI = 2·20–2·45*; RI = 1·50–1·80*; PI = 2·30–2·70*; ICI = 1·10–1·25*.

Propodeum reticulate, spiracle from subcircular to 1·5 times as long as broad; apex of propodeum reaching about 0·5 of length of hind coxae; gaster elongate.

♀ genitalia. Valvula 3 from a little longer than apical abdominal depth to 0·7 of length of tergite 3; apex of ovipositor constricted, constricted part about 3·0 times as long as thickness of ovipositor medially; extreme apex decurved; ovipositor weakly laterally compressed, sometimes entire ovipositor decurved.

♂ genitalia. Separate syntergites present; ninth abdominal sternite transverse posteriorly truncate; gonosquamae short, truncate; gonolaciniae distally evenly rounded about 80°; teeth indistinct; apodeme straight, reaching 0·3 of length of basivolsellar strut. Distivolsella slender, basally 0·5 times as wide as long; clasping face flat, teeth scattered diagonally. Paramere proximally rounded. Aedeagus in profile weakly angled, apically rounded, dorsally with apical swelling, otherwise rather flat; membranous except for sclerotized lateral region which is decurved apically, reaching the aedeagal margin at apicoventral corner; ventral membranous region extended laterally (Text-figs 76, 127).

This genus is little more than a rather uniform group of *Agrypon* species, but as it is quite possible at present to separate reliably these two groups they have been retained as distinct genera.

Distribution. *Perisphincter* species occur mainly in the Indo-Papuan region where to a large extent they replace *Agrypon* species. Townes tentatively refers a single Neotropical species to this genus. An undescribed species is known to occur in Australia.

Included species. Of the three described species only *P. tisiphone* (Morley) is known to the author. Seven undescribed species have also been examined.

Genus ***PHAENOLABRORYCHUS*** Viereck

Phaenolabrorychus Viereck, 1914*b* : 379. Type-species: *Phaenolabrorychus anisitsi* Viereck, 1914*b* : 379, by original designation.

Eyes with very sparse short pubescence, which is often difficult to observe; occipital carina complete, close to posterior ocelli; frons with an indistinct median vertical carina. Antennae long, those of ♀ without a white band, scape truncate, 0·8–0·9 times as long as pedicel, fourth flagellar segment about 3·0 times as long as broad; apex of clypeus with two acute teeth; mandible bidentate, lower tooth distinctly the shorter, apices twisted about 15°; labial palpi with three segments; cardo basally lobate. Genal carina joining base of mandible close to hypostomal carina.

Pronotum moderately long dorsally, subvertical, with transverse groove which is centrally wanting, posterior corner occluding about 0·3 of spiracular sclerite; lower anterior margin of pronotum without a tooth, but with a tubercle at base of epomia, lower corner truncate. Anterior of mesoscutum abruptly angularly rounded, with trace of an apical concavity; notaulus distinct, reaching to hind margin of mesoscutum; medio-posterior area of mesoscutum coriaceous; transverse suture of mesoscutum absent, transverse furrows distinct and obvious. Epicnemial carina reaching above centre of mesopleuron, angled apically to reach anterior margin of mesopleuron; sternaulus impressed as a broad groove; epicnemial carina medioventrally raised into a small lamella; posterior transverse carina of mesosternum complete.

Fore coxae almost flat beneath, the flattened area bounded by an anterior/anterio-medial carina; fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two apical spurs. Hind trochanter 1·8 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws short, curved, pectinate to apices, not obviously sexually dimorphic.

Forewing with *Rs* straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separate, but close together, hindwing with 7–9 hamuli on R_1; distal abscissa of Cu_1 absent.

CI = 0·15–0·25; BI = 1·90–2·10; DBI = 0·80–0·85; MI = 2·10–2·50; RI = 1·10–1·25; PI = 5·30–5·50; ICI = 1·10–1·20.

Propodeum reticulate, spiracle subcircular, unusual in being angled in surface of propodeum so that plane of spiracular aperture is horizontal; propodeum posteriorly produced into 'neck' which is unsculptured and reaches about 1·40 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 0·6 times as long as tergite 3; apex of ovipositor slightly sinuous, evenly acutely pointed, extreme apex obviously decurved; ovipositor not laterally compressed.

♂ genitalia. Syntergites not fused; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae truncate, short. Gonolacinae distally evenly rounded about 75°; teeth small; apodeme straight, reaching about 0·4 of length of basivolsellar strut. Distivolsella slender, basally 0·5 times as wide as long; clasping face flat, teeth arranged diagonally on a weak ridge. Paramere proximally acute. Aedeagus in profile weakly angled, apically truncate, dorsally almost flat, membranous, ventrally laterally produced; sclerotized area not reaching aedeagal apex (Text-fig. 128).

This genus has been confused with *Agrypon* in the past (Townes & Townes, 1966) although in recent work (1971) Townes retained it as a separate genus. *Phaenolabrorychus* has been found to be distinct from *Agrypon* in a number of ways. The elongate unsculptured propodeal neck is a particularly obvious feature of this genus which is not found in *Agrypon* but there are also other consistant differences. The scape of *Phaenolabrorychus* is slightly shorter than the pedicel, whereas in *Agrypon* the scape is clearly longer than the pedicel (Text-fig. 171). *Phaenolabrorychus* is characterized by the possession of three deep furrows immediately in front of the scuto-scutellar groove, whereas in *Agrypon* there are usually no furrows present, and if furrows are present they are small and weakly impressed, quite unlike those of *Phaenolabrorychus* (Text-figs 178, 180). The shape of the clypeus, positioning of the petiolar spiracles and the form of the ovipositor of *Phaenolabrorychus* may also be used to distinguish this genus from *Agrypon*.

DISTRIBUTION. This genus is apparently restricted to the Neotropical region.

INCLUDED SPECIES. Only one species, *P. anisitsi* Viereck, is referable to this genus at present.

Genus **PARANIA** Morley

Parania Morley, 1913*a* : 96. Type-species: *Parania nototrachoides* Morley, 1913*a* : 97 [= *Atrometus tricolor* Szépligeti, 1906 : 126], by monotypy.

Eye glabrous, ventrally convergent; occipital carina complete, close or moderately close to posterior ocelli, separated at a maximum by about 1·3 of ocellar diameter; frons without a median vertical carina. Antennae short to moderately long, those of ♀ without a white band; scape truncate, about 1·5 times as long as pedicel; fourth flagellar segment about 3·0 times as long as broad. Apex of clypeus acute, with a median tooth; mandible bidentate, lower tooth distinctly the shorter, apices not twisted; labial palps of three segments; cardo basally lobate. Genal carina joining base of mandible.

Pronotum dorsally moderately long, subvertical, with transverse furrow, posterior corner occluding about 0·4 of spiracular sclerite; lower anterior margin of pronotum without a tooth, lower corner truncate. Anterior of mesoscutum abruptly rounded, without an impressed area; notaulus indistinct or absent; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina reaching to centre of mesopleuron, its upper end reaching anterior margin of mesopleuron; epicnemial carina medio-ventrally not produced; sternaulus absent; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter about 2·0 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws weakly curved, moderately long, those of ♀ more curved and pectinate than those of ♂.

Forewing with *Rs* straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally fused; hindwing with 5–8 hamuli on R_1; distal abscissa of Cu_1 absent.

BI = 1·20–1·35; DBI = 0·50–0·72; MI = 1·30–1·68; RI = 0·67–0·80; ICI = 0·90–1·25; PI = 1·75–2·05.

Propodeum punctate, or weakly reticulate, spiracle circular to 2·0 times as long as broad; propodeum posteriorly reaching 0·7 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 about 0·9 times as long as tergite 3; apex of ovipositor almost hastate, elongately acutely pointed, extreme apex decurved; ovipositor laterally compressed (Text-figs 7, 12, 29).

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short, subacute. Gonolacinae distally evenly curved about 50°; teeth large and conspicuous; apodeme straight, reaching 0·65 of length of basivolsellar strut. Distivolsella broad basally, 1·0 times as wide as long; clasping face flat with few scattered teeth. Paramere proximally broadened before tapering abruptly to an acute apex (Text-fig. 45). Aedeagus in profile straight, acutely pointed, with a minute dorsal membranous area and a long narrow ventral membrane that is not extended laterally (Text-figs 54, 74, 132).

Parania has previously gone under the name *Atrometus* until Townes (1971) pointed out that *Atrometus*, as represented by the type-species *A. insignis*, was quite a distinct genus. The majority of so-called *Atrometus* species were placed in *Parania* which previously had been included as a synonym of *Atrometus* (Townes & Townes, 1966).

Parania is a very distinctive genus and not at all as closely related to *Agrypon* as previous authors supposed (Morley, 1915). *Parania* has consistently fewer hamuli on vein R_1 than any of the 'Agryponine' genera (that is *Agrypon*, *Perisphincter* and *Phaenolabrorychus*) and has a significantly smaller value of RI. The most striking difference between *Parania* and the 'Agryponine' genera have been observed in the form of the female and male genitalia. The ovipositor of *Parania* is quite characteristic and unlike that of most other Therionini except to some extent *Pseudanomalon*. The aedeagus of *Parania* species is unique, no other specimen examined was found to have a straight apically acute aedeagus. The aedeagi of *Spolas* and *Clatha* are closest in structure to that of *Parania* and it is possible that reduction of the membranous area of a *Clatha*-type aedeagus could have resulted in the aedeagus of *Parania*. However, there are considerable macromorphological differences between species of these genera. The relationships between this and other genera are more fully discussed below.

DISTRIBUTION. *Parania* is recorded from all regions except the Australian.

INCLUDED SPECIES. The following species were examined:

P. albopilosella (Cameron), *P. tricolor* (Szépligeti), *P. geniculata* (Holmgren) and two undescribed species.

Genus ***SPOLAS*** Townes

Spolas Townes, 1961 : 473. Type-species: *Atrometus flavifrons* Ashmead, 1901*b* : 352, by original designation.

Eyes glabrous or with sparse short hairs, margins weakly to strongly convergent ventrally; occipital carina complete, close to posterior ocelli, separated by not more than 1·0 of ocellar diameter; frons without a median vertical carina. Antennae moderately long, those of ♀ without a white band; scape subtruncate, sometimes flattened medianly, about 1·2 times longer than pedicel; fourth flagellar segment more than 7·0 times as long as broad. Apex of clypeus rounded with a median tooth, to subtruncate without a tooth; mandible bidentate, apices not or very slightly twisted, lower mandibular tooth distinctly the shorter; labial palps with three segments. Genal carina sinuate ventrally, parallel to hypostomal carina, which turns sharply along lower margin of hypostoma to join genal carina at base of mandible.

Pronotum dorsally narrow, subhorizontal, with transverse furrow, posterior corner with weak to strong dorsal flanges, partially occluding spiracular sclerite; lower anterior margin of pronotum without a tooth, lower corner rounded. Anterior of mesoscutum abruptly rounded, with weak median apical concavity; notaulus absent; medio-posterior region of mesoscutum densely and finely punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina reaching above centre of mesopleuron, its upper end reaching anterior margin of mesopleuron; epicnemial carina medio-ventrally not produced; sternaulus present as a concavity; posterior transverse carina of mesosternum present only laterally as vestiges.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter about 1·2 times longer than trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws curved, pectinate almost to apex, not obviously sexually dimorphic.

Forewing with *Rs* almost straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separate, but close together. Hindwing with 4–6 hamuli on R_1; distal abscissa of Cu_1 absent.

CI = 0·20–0·35; BI = 1·20–1·45; DBI = 0·55–0·65; MI = 2·40–3·05; RI = 0·25–0·35; ICI = 1·10–1·33; PI = 1·75–2·50.

Propodeum coriaceous, spiracles circular or subcircular; propodeum posteriorly reaching 0·3 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 a little longer than apical depth of abdomen; apex of ovipositor elongately pointed, extreme apex weakly decurved; ovipositor weakly laterally compressed; unusual in having a dorsal subapical swelling that is large and convex.

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse and truncate posteriorly; gonosquamae short, acute. Gonolaciniae evenly rounded distally about 80°; teeth small; apodeme straight, reaching 0·5 of length of basivolsellar strut. Distivolsella moderately broad, basally 0·6 times as wide as long, clasping face flat, teeth arranged peripherally. Parameres proximally spatulate (Text-fig. 46). Aedeagus in profile weakly decurved, apically acute, dorsal membranous area present, ventral membranous area absent, lateral sclerotized area extending apically; ventral margin of aedeagus laterally extended into triangular regions (Text-figs 58, 81, 82, 133).

This distinctive genus is at once recognizable by the elongate basal flagellar segments, the dorsal pronotal flanges (Text-fig. 203), and the very small value of RI.

DISTRIBUTION. Hitherto this genus was recorded only from the Hawaiian Islands but in the collections of the BMNH are two males, one from Ohakun, New Zealand (coll. T. R. Harris) and one from Nelson, New Zealand (coll. E. S. Gourlay) which are referable to this genus.

INCLUDED SPECIES. The following species have been examined and found to be referable to this genus:

Spolas citricincta (Ashmead), *S. delicata* (Ashmead), *S. flavifrons* (Ashmead), *S. haleakale* (Ashmead), *S. hawaiiensis* (Ashmead), *S. molokaiensis* (Ashmead), *S. tarsata* (Ashmead) and *S. tephrias* (Perkins). Two further undescribed species have been seen.

Genus **METOA** Townes

Metoa Townes, 1971 : 147. Type-species: *Anomalon exile* Provancher, 1874 : 175, by original designation.

Eyes without pubescence, margins ventrally convergent; occipital carina complete, mediodorsally distant from posterior ocelli; frons without a median vertical carina. Antennae rather short to moderately long, those of ♀ without a white band; scape truncate, about 1·2 times as long as pedicel; fourth flagellar segment about 3·0 times as long as broad. Apex of clypeus convex or with two latero-median teeth; mandible bidentate, lower tooth distinctly the shorter, often very reduced to absent, apices not twisted; labial palpi of three segments. Genal carina joining hypostomal carina close to base of mandible.

Pronotum dorsally moderately long, subvertical, without transverse furrow, posterior corner not occluding spiracular sclerite; lower anterior margin of pronotum without a tooth, lower corner truncate. Anterior of mesoscutum evenly rounded, without a concavity; notaulus absent or indistinct; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina reaching above centre of mesopleuron, with upper end close to and parallel with anterior margin of mesopleuron; epcinemial carina medio-ventrally very weakly produced; sternaulus indistinct; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two apical spurs. Hind trochanter more than 2·0 times as long as trochantellus; hind tarsal claws weakly curved, rather long, pectinate to near apex.

Forewing with *Rs* weakly sinuate; *2 + 3rm* proximal to *2m-cu*; *1m-cu* and Cu_{1a} basally close together, but not touching. Hindwing with six hamuli on R_1; distal abscissa of Cu_1 absent.

CI = 0·10*; BI = 1·20*; DBI = 0·55*; MI = 1·90*; RI = 0·90*; PI = 1·65*; ICI = 1·25*.

Propodeum reticulate, spiracle less than 2·0 times as long as broad; posterior of propodeum reaching 0·4 of length of hind coxa. Gaster elongate.

♀ genitalia. Valvula 3 about as long as apical depth of abdomen; ovipositor with apex abruptly constricted, constricted part more than 3·0 times as long as median thickness of ovipositor, extreme apex decurved; ovipositor laterally compressed.

♂ genitalia. Single syntergum present although with anterior margin markedly indented centrally; ninth abdominal sternite transverse, truncate posteriorly; gonosquamae short, acute. Gonolaciniae abruptly rounded distally about 90°; teeth moderately large; apodeme straight, reaching 0·5 of length of basivolsellar strut. Distivolsella moderately broad basally, about 0·55 times as wide as long; clasping face flat, teeth arranged diagonally. Parameres proximally obliquely truncate. Aedeagus in profile almost straight, apically evenly rounded with dorsal and ventral membranous regions present; ventral membranous area large, laterally extended into two small triangular flanges (Text-fig. 139).

This genus is immediately distinguished by the shape of the head dorsally. The occipital carina is separated from the posterior ocelli by at least 3·0 times the ocellar diameter.

DISTRIBUTION. This is a small genus only recorded from the Nearctic region.

INCLUDED SPECIES. Only one species, *M. exilis* (Provancher), is known to be referable to this genus. A second species is represented by a damaged specimen in the collections of the BMNH.

Genus *CALCANEUM* Townes

Calcaneum Townes, 1971 : 145. Type-species: *Calcaneum oporinum* Townes, 1971 : 146, by original designation.

At present no further information may be added to the original description included by Townes.

Distribution. This genus in apparently restricted to the Nearctic region.

Included species. Only the type-species, *Calcaneum oporinum* Townes, is known to be referable to this genus.

Genus *CLATHA* Cameron

Clatha Cameron, 1905*a* : 129. Type-species: *Clatha longipes* Cameron, 1905*a* : 130, by monotypy.

Eyes glabrous, weakly convergent ventrally; occipital carina complete, mediodorsally often weakly concave, close to posterior ocelli; frons without a median vertical carina. Antennae long, those of ♀ without a white band, scape truncate, 1·5 times as long as pedicel, fourth flagellar segment 4·0 times as long as broad. Apex of clypeus with a median apical tooth; mandibles bidentate, lower tooth distinctly the shorter, apex twisted about 30°; labial palps with three segments. Genal carina joining hypostomal carina before base of mandible.

Pronotum dorsally moderately long, subvertical, flat, posterior corner occluding up to 0·5 of spiracular sclerite; lower anterior margin of pronotum with tubercle at base of epomia, lower corner truncate. Anterior of mesoscutum abruptly but evenly rounded, with a small apical concavity; notaulus indistinct or absent; medio-posterior region of mesoscutum punctate or coriaceous, transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina reaching to about 0·4 of way up mesopleuron, sinuate with upper end remote from anterior margin of mesopleuron; epicnemial carina medio-ventrally raised into an acute protruberance which projects towards fore coxae; sternaulus absent; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face; mid tibia with two apical spurs; hind trochanter more than 2·0 times as long as trochantellus; hind tarsi of ♂ not explanate; hind tarsal claws short, curved, pectinate almost to apices, not obviously sexually dimorphic.

Forewing with *Rs* straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally united. Hindwing with 5–6 hamuli on R_1; distal abscissa of Cu_1 absent.

BI = 3·80–4·10*; DBI = 0·85–0·95*; MI = 2·60–2·85*; RI = 0·50–0·65*; ICI = 0·50–0·60*; PI = 3·20–3·52*.

Propodeum reticulate, spiracles more than 3·0 times as long as broad; propodeum posteriorly reaching about 0·5 of length of hind coxa. Gaster elongate.

♀ genitalia. Valvula 3 about 1·2 times as long as tergite 3; apex of ovipositor abruptly constricted, constricted part about 3·0 times as long as thickness of ovipositor medianly, extreme apex straight; ovipositor weakly laterally compressed; unusual in having dorsal subapical swelling conspicuously enlarged, very convex.

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae moderate in length. Gonolaciniae very elongate and slender, distally angled about 20°; teeth large, arranged on swollen area; apodeme almost straight, reaching 0·9 of length of basivolsellar strut. Distivolsella moderately broad, distally tapered slightly, basally about 0·65 times as wide as long; clasping face flat except for the bases of large spines that are clustered centrally. Paramere proximally spatulate. Aedeagus in profile more or less straight, apically acutely pointed with small dorsal and ventral membranous areas; lateral sclerotized region extending medio-apically well beyond membranous areas; ventral area not laterally extended (Text-figs 43, 53, 71, 134).

The form of the male claspers of species of this genus is quite unlike that of any other except *Atrometus*. The affinities of this genus are at present not clear but it is closely related to *Atrometus*. These genera do not appear to be particularly closely related to other 'Podogastrine' genera. The aedeagus is not unlike that of *Spolas* species.

DISTRIBUTION. Oriental but possibly also occurs in East Africa.

INCLUDED SPECIES. Only one named species, *C. longipes* Cameron, is known but a second species is represented by two males in the collections of the BMNH.

Genus *ATROMETUS* Foerster

Atrometus Foerster, 1868 : 146. Type-species: *Atrometus insignis* Foerster, 1878 : 77, by subsequent designation (Viereck, 1914*a* : 17).

Eye glabrous, inner margins subparallel; occipital carina present, mediodorsally separated from posterior ocelli by about 1·0 times the ocellar diameter; frons without a median vertical carina. Antennae moderately long, scape truncate, about 1·2 times as long as pedicel; fourth flagellar segment about 2·0 times as long as broad. Clypeus with a median apical tooth; mandible bidentate, lower tooth distinctly the shorter, apices twisted about 30°; labial palpi with three segments, cardo basally lobate. Genal carina joining hypostomal carina at or before mandibular base.

Pronotum dorsally long, subvertical, without a transverse furrow, posterior corner occluding about 0·7 of spiracular sclerite; lower anterior margin of pronotum with a tubercle at the base of epomia, lower corner acute. Mesoscutum anteriorly abruptly rounded, without an apical concavity; notauli indistinct or weak; medio-posterior region of mesoscutum coriaceous; transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina reaching to centre of mesopleuron, parallel to anterior margin of mesopleuron; epicnemial carina medio-ventrally strongly produced into acute process that extends between anterior coxae; sternaulus absent; posterior transverse carina of mesosternum complete.

Fore coxa smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter 1·2 times as long as trochantellus; hind tarsi of male very swollen; hind tarsal claws curved, basally pectinate.

Forewing with *Rs* weakly bowed; 2 + 3*rm* proximal to *2m-cu*; *1m-cu* and Cu_{1a} basally contiguous. Hindwing with 6–8 hamuli on R_1; distal abscissa of Cu_1 absent.

BI = 1·75–1·85*; DBI = 0·85–0·92*; MI = 1·90–2·00*; RI = 0·87–0·94*; ICI = 1·10–1·22*; PI = 2·60–2·80*.

Propodeum reticulate, spiracles more than 5·0 times as long as broad; propodeum posteriorly reaching about 0·5 of length of hind coxa. Gaster elongate.

♀ unknown.

♂ genitalia. Single syntergum present; ninth abdominal sternite rhomboidal; gonosquamae long, terminally acute. Gonolacinia very elongate and slender, distally angled about 30°; teeth large; apodeme almost straight, about 0·8 of length of basivolsellar strut. Distivolsellar slender, basally less than 0·2 times as wide as long; clasping face convex, large teeth centrally arranged. Paramere proximally spatulate-lobate. Aedeagus in profile decurved, terminally rounded, extreme apex weakly upcurved, separate dorsal and ventral membranous areas present; lateral sclerotized region apically bifid, lower branch reaching margin of aedeagus and protruding as an out-turned flap (Text-figs 34, 135).

The structure of the male genitalia is very similar to that of *Clatha* though less specialized. In both genera there is considerable modification of the claspers in a similar way and the structure of the aedeagus is also similar. It is considered likely that these two genera are very closely related.

Distribution. This genus is recorded from the Mediterranean region.

Included species. Only a single species, *A. insignis*, is known to be referable to this genus at present.

Genus ***CECHENODES*** Townes

Cechenodes Townes, 1971 : 150. Type-species: *Cechenodes oweni* Townes, 1971 : 151, by original designation.

Eye with scattered pubescence, margins ventrally convergent; occipital carina complete, mediodorsally arched weakly, close to posterior ocelli; frons with a median vertical carina. Antennae long, those of ♀ without a white band; scape truncate, about 1·2 times as long as pedicel; fourth flagellar segment about 3·0 times as long as broad. Clypeus with a median apical tooth; mandibles bidentate, lower tooth distinctly the shorter, apices twisted slightly; labial palpi with three segments. Genal carina joining base of mandible separated from hypostomal carina.

Pronotum dorsally very long, subvertical, with a transverse furrow; posterior corner almost entirely occluding spiracular sclerite; lower anterior margin of pronotum with a tubercle at base of epomia, lower corner truncate. Anterior of mesoscutum abruptly rounded, without concavity; notauli present anteriorly as rugose areas; medio-posterior region of mesoscutum rugose; transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina reaching above centre of mesopleuron, close to anterior mesopleural margin and with upper end reaching margin; epicnemial carina medio-ventrally very weakly raised into a flange; sternaulus absent; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spurs with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter about 1·3 times as long as trochantellus; hind tarsal claws pectinate on basal 0·7.

Forewing with *Rs* sinuate; 2 + 3*rm* proximal to *2m–cu*; *1m–cu* and Cu_{1a} basally separated. Hindwing with 5–7 hamuli on R_1; distal abscissa of Cu_1 absent.

CI = 0·57–0·68*; BI = 2·00–2·15*; DBI = 0·65–0·76*; MI = 1·65–1·75*; RI = 0·85–0·97*; PI = 4·70–5·50*; ICI = 1·10–1·25*.

Propodeum reticulate, spiracle about 2·0 times as long as broad; propodeum posteriorly extended into an unsculptured neck about 1·4 times as long as hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 about 0·55 times as long as tergite 3; apex of ovipositor constricted, the constricted part at least 3·0 times as long as thickness of ovipositor medianly; extreme apex weakly decurved; ovipositor weakly laterally compressed.

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short, truncate. Gonolaciniae distally rather abruptly curved about 85°; teeth large; apodeme straight, extending 0·5 of length of basivolsellar strut. Distivolsella moderately broad, about 0·55 times as wide basally as long; clasping face flat, teeth arranged diagonally. Aedeagal paramere proximally unusually broad, truncate. Aedeagus in profile strongly geniculate, apically truncate; dorsal and ventral membranous areas present, the latter large and separated from the lateral sclerotized region by an invaginated area; ventral area laterally weakly extended into small triangular flanges (Text-figs 63, 137).

Distribution. This genus is only recorded from the Ethiopian region.

Included species. Only the type-species, *Cechenodes oweni* Townes, is referable to this genus at present.

Genus *BIMENTUM* Townes

Bimentum Townes, 1971 : 151. Type-species: *Bimentum notatum* Townes, 1971 : 152, by original designation.

Eyes without pubescence, margins ventrally subparallel or weakly convergent; occipital carina complete, medio-dorsally separated from hind ocelli by about diameter of ocellus; frons with indistinct median vertical carina. Antennae very long, those of ♀ without a white band; scape truncate, about 1·2 times longer than pedicel; fourth flagellar segment about 3·0 times as long as broad. Clypeus with a median apical tooth; mandible bidentate, lower tooth a little shorter than upper, apices twisted about 40°; labial palps with three segments. Genal carina joining hypostomal carina away from base of mandible.

Pronotum dorsally long, subvertical, without a transverse furrow, posterior corner covering spiracular sclerite; lower anterior margin of pronotum with an indistinct tubercle at base of epomia, lower corner truncate. Anterior of mesoscutum very abruptly rounded, without an apical concavity; notauli impressed, not extending beyond centre of mesoscutum; medio-posterior region of mesoscutum punctate, transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina reaching to centre of mesopleuron, its upper end reaching anterior margin of mesopleuron and with lower region close to lower corner of pronotum; epicnemial carina medio-ventrally produced into a weak lamella; sternaulus absent; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two spurs. Hind trochanter about 2·0 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws curved, pectinate beyond centre; not obviously sexually dimorphic.

Forewing with *Rs* almost straight; 2 + 3*rm* proximal to *2m-cu*; *1m-cu* and Cu_{1a} basally united. Hindwing with 8–9 hamuli on R_1; distal abscissa of Cu_1 absent.

BI = 2·30–2·50*; DBI = 0·90–1·05*; MI = 2·00–2·15*; RI = 1·05–1·20*; ICI = 1·20–1·40*; PI = 3·50–4·00*.

Propodeum reticulate, spiracle at least 5·0 times as long as broad; propodeum posteriorly extended into sculptured neck about 0·6 times as long as hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 0·6–0·8 times as long as abdominal tergite 3; apex of ovipositor constricted, constricted part more than 3·0 times as long as thickness of ovipositor medianly, extreme apex weakly decurved; ovipositor weakly laterally compressed.

♂. Not available for dissection.

Townes includes *Podogaster spilopterus* within this genus but examination of the type-material of this species has shown that it is not congeneric with *B. notatum*. This species is very distinct from any other described genus and is placed in a separate new genus described below.

DISTRIBUTION. Townes (1971; 1973) has recorded this genus only from the Ethiopian region but in the collections of the BMNH is a single female of an undescribed species from Madagascar.

INCLUDED SPECIES. Only one named species, *Bimentum notatum* Townes, is referred to this genus at present.

Genus *VERNAMALON* gen. n.

Type-species: *Podogaster spilopterus* Morley, 1913*a* : 61.

Eye without pubescence, margins ventrally moderately convergent; occipital carina complete, mediodorsally widely separated from posterior ocelli by more than 3·0 times ocellar diameter; frons with an indistinct median vertical carina. Antennae moderately long, those of ♀ without a white band; scape truncate, 1·5 times longer than pedicel, in the male with the scape flattened on inner surface; fourth flagellar segment about 3·0 times as long as broad. Clypeus with a pair of median apical teeth; mandible bidentate, lower tooth a little shorter than upper; apices weakly twisted about 15°; labial palpi with three segments. Genal carina joining hypostomal carina away from mandible base.

Pronotum dorsally long, vertical, without a transverse furrow, posterior corner occluding about 0·5 of spiracular sclerite; lower anterior margin of pronotum without a tubercle, lower corner truncate. Anterior of mesoscutum rather evenly rounded with a shallow apical concavity; notauli represented by a shallowly coriaceous area which in posterior 0·5 of mesoscutum is produced into an obvious raised ridge (Text-fig. 231); medio-posterior region of mesoscutum rugose; transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina reaching to centre of mesopleuron, its upper end reaching anterior margin of mesopleuron; epicnemial carina medio-ventrally produced into weak lamella; sternaulus absent; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter subequal in length to trochantellus; hind tarsi of ♂ not swollen; hind tarsal claw curved, basally pectinate, not obviously sexually dimorphic.

Forewing with vein *Rs* distally curved; 2 + 3*rm* proximal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally contiguous. Hindwing with 6–8 hamuli on R_1; distal abscissa of Cu_1 absent.

BI = 1·28–1·35*; DBI = 0·65–0·75*; MI = 1·37–1·62*; RI = 0·90–1·05*; ICI = 0·90–1·12*; PI = 1·40–1·60*.

Propodeum reticulate with spiracle about 4·0 times as long as broad; propodeum posteriorly extended 0·5 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 0·7 times as long as tergite 3; apex of ovipositor simply acutely pointed; extreme apex straight; ovipositor not at all laterally compressed.

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse; posteriorly truncate; gonosquamae large, truncate, weakly sclerotized. Gonolaciniae distally evenly curved about 80°; teeth large; apodeme straight, extending 0·5 of length of basivolsellar strut. Distivolsella slender, basally 0·5 times as wide as long, apically acute; clasping face flat, teeth arranged peripherally. Aedeagal paramere proximally spatulate, pointed. Aedeagus in profile straight, apically rounded, very membranous; weakly sclerotized lateral area angled ventrally to reach apico-ventral corner of aedeagus; ventral region not laterally extended (Text-figs 48, 62, 66, 136).

This genus may be distinguished from *Bimentum* in the following ways: having the clypeus with a pair of apical teeth, having elaborate sculpture on the mesoscutum, having the hind trochanter subequal in length to the trochantellus, the form of the genitalia and having the occipital carina widely separated from the posterior ocelli.

The form of the clypeus and position of the occipital carina in this genus are similar to that of *Metoa* but *Metoa* lacks the transverse suture of the mesoscutum.

DISTRIBUTION. This genus is only recorded from the Ethiopian region.

INCLUDED SPECIES. At present only the type-species, *Vernamalon spilopterum* (Morley), is referable to this genus.

Genus **BRACHYNERVUS** Uchida

Brachynervus Uchida, 1955 : 123. Type-species: *Brachynervus tsunekii* Uchida, 1955 : 124, by original designation.

Eyes glabrous, inner margins ventrally weakly convergent; occipital carina dorsally incomplete; frons with a raised lamella. Antennae very long, those of ♀ without a white band;

scape truncate, more than 2·0 times as long as pedicel; fourth flagellar segment about 1·5 times as long as broad. Clypeus with a pair of median teeth; mandibles bidentate, apices strongly twisted about 40°, angled, lower tooth a little shorter than upper; labial palps with three segments. Genal carina joining hypostomal carina before mandibular base.

Pronotum dorsally not long, vertical, without a transverse furrow, posterior corner not occluding spiracular sclerite, lower anterior margin of pronotum with a tooth, lower corner truncate. Mesoscutum anteriorly abruptly rounded without an apical concavity; notauli not discernible except as area of different coloration; medio-posterior region of mesoscutum reticulate; transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina laterally indistinct, medio-ventrally not raised; sternaulus indistinct; posterior tranverse carina of mesosternum absent.

Fore coxae with anterio-medial longitudinal carinae; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with a single spur; hind trochanter about 1·8 times as long as trochantellus; hind tarsal claws geniculate with a basal lobe.

Forewing with *Rs* weakly sinuate; 2 + *3rm* when present well proximal to *2m–cu*, the veins separated by a length of *M* about equal in length to *2m–cu* so that the second discal cell is approaching a regular pentagon in shape; *1m–cu* and Cu_{1a} basally separated. Hindwing with seven widely spaced hamuli on vein R_1; distal abscissa of Cu_1 present.

CI = 0·51–0·56*; BI = 2·00–2·23*; DBI = 0·90–0·96*; MI = 2·00–2·20*; NI = 2·10–2·20*; RI = 1·20–1·30*; ICI = 0·15–0·19*; PI = 2·80–3·00*.

Propodeum reticulate, spiracle more than 7·0 times as long as wide; posterior of propodeum convexly rounded with insertion of petiolar segment well separated from insertion of hind coxae so that whole of propodeum appears globosely inflated. Gaster slender.

♀ genitalia. Valvula 3 about 0·6 times as long as tergite 3; ovipositor apically acute, without elongate tip, extreme apex straight; ovipositor markedly laterally compressed.

♂ genitalia. This was not available for dissection but the aedeagus of the type-specimen is described.

Aedeagus apically rounded, rather evenly sclerotized without distinct membranous areas and not laterally extended ventrally.

This is an extremely distinctive genus of doubtful affinity. Townes (1971) placed this genus in his Theriini but the wing venation, form of the propodeum and presence of the mesoscutal suture are characters not found in any other Theriine genera. The presence of the mesoscutal suture would seem to indicate that this genus is allied to the 'Podogastriine' genera but *Brachynervus* differs from these in having the distal abscissa of Cu_1 present in the hindwing and the posterior transverse carina of the mesosternum vestigial, as well as in the form of the wing venation and shape of the propodeum.

There is in the collection of the BMNH a species described as *Anomalon tinctipenne* Cameron by Morley (1913*a*). The type-specimen of *A. tinctipenne* (deposited at the University Museum, Oxford) is referable to the genus *Heteropelma* and is a different species. *A. tinctipenne* Cameron sensu Morley is a new species of *Brachynervus* and is described below.

***Brachynervus confusus* sp. n.**

[*Anomalon tinctipenne* Cameron sensu Morley, 1913*a* : 83. Misidentification.]

Holotype ♀, CHINA: Shantung, Ching-tao (Tsingtao) Lazarettgarten, August, no further date (*Hoffman*) (BMNH).

Forewing 13 mm.

Antennae very long, with 72 flagellar segments; lower face rather flat; cheeks broad, distance between orbit and mandibular base approximately the same as the length of second flagellar segment. Clypeus small, flat and apically with a median notch; mandibles short, at their distal end abruptly curved; lower tooth 0·5 of length of upper. Frons with a median vertical lamella; head in profile with gena centrally broad, narrowed dorsally and ventrally.

Scutellum deplanate; posterior transverse carina of mesosternum present vestigially only before each mid coxae; entire thorax and propodeum coarsely reticulately rugose. Fore and mid tarsal claws strongly curved, coarsely pectinate except apically, hind tarsal claws strongly geniculate, not pectinate.

Wings infumate. Head black; genae, marks on vertex, lower face, clypeus and mandibles, except apically, yellow; antennae fulvous, scape basally reddish brown, apically yellow. Thorax black, yellow-marked on anterior margin of pronotum, mesoscutum in four longitudinal stripes and entirely apically, tegulae, subalar prominance, scutellum, postscutellum, metanotum and propodeum apically and laterally. Fore and mid legs yellow, hind legs red brown with tarsi yellow. Abdomen concolorous red-brown.

♂ unknown.

Paratype. (Terminal segments of abdomen missing.) India: Khasia Hills, no further data (BMNH).

B. confusus differs from the type-species of the genus *B. tsunekii* principally in the wing venation. *B. tsunekii* has 2 + 3*rm* entirely lacking and the second discal cell almost regularly pentagonal. *B. confusus* has 2 + 3*rm* present and the second discal cell irregularly pentagonal (Text-figs 199, 200).

Distribution. This genus appears to be restricted to colder parts of the south-eastern Palaearctic region.

Included species. Only two species, *B. tsunekii* and *B. confusus*, are known to be referable to this genus.

Genus ***PODOGASTER*** Brullé

Podogaster Brullé 1846 : 179. Type-species: *Podogaster coarctata* Brullé, 1846 : 179, by monotypy.

Eye with sparse hair, margins exceptionally strongly convergent ventrally; occipital carina complete, sometimes dorsally indistinct, close to posterior ocelli; frons without a median vertical carina. Antennae long, those of ♀ without a white band; scape truncate to slightly oblique, 0·9–1·2 times as long as pedicel; fourth flagellar segment about 4·0 times as long as broad. Clypeus with a median apical tooth; mandibles bidentate, lower tooth distinctly the shorter, apically twisted about 30°; labial palpi with three segments; cardo basally lobate. Genal carina present or absent, when present joining hypostomal carina before mandible base.

Pronotum dorsally wide or moderately wide, subvertical, without a distinct continuous transverse furrow; posterior corner not or only just occluding spiracular sclerite; lower anterior margin of pronotum with a blunt tooth at base of epomia, lower corner truncate. Anterior of mesoscutum abruptly rounded, without an apical concavity; notauli impressed, coriaceously sculptured; medio-posterior region of mesoscutum rugose; transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina reaching above centre of mesopleuron, its upper end joining anterior margin of mesopleuron; epicnemial carina medio-ventrally produced into an acute process that is extended between the anterior coxae; sternaulus present, strongly impressed, 0·3–0·6 times as long as mesopleuron; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter 2·5 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws pectinate almost to apex, not obviously sexually dimorphic.

Forewings with *Rs* straight; 2 + *3rm* proximal to *2m–cu*; *1m–cu* and Cu_{1a} basally adjacent; hindwing with 3–5 hamuli on R_1; distal abscissa of Cu_1 absent.

BI = 1·90–2·90; DBI = 1·25–1·42; MI = 2·35–3·10; RI = 1·00–1·15; ICI = 0·35–0·62; PI = 9·00–11·00.

Propodeum reticulate, spiracles about 2·5 times as long as broad; posterior of propodeum extended into a smooth 'neck' that is 0·95 of length of hind coxa. Gaster elongate.

♀ genitalia. Valvula 3 about 1·5 times as long as abdominal tergite 3; apex of ovipositor constricted, constricted part about 2·5 times as long as median thickness of ovipositor, extreme apex decurved; ovipositor weakly laterally compressed.

♂ genitalia. Single syntergum present or with medio-anterior dorsal membrane partially separating syntergites; gonosquamae short. Gonolaciniae distally evenly angled about 50°; teeth indistinct; apodeme angled about 10° from axis of gonolacinia, extending 0·65 of length of basivolsellar strut. Distivolsellar moderately broad, 0·65 times as broad basally as long; clasping face flat, teeth arranged peripherally. Aedeagal paramere proximally angled, lobate, elongately acute. Aedeagus in profile with apex weakly decurved, apically rounded, membranous; lateral sclerotized region not reaching apex of aedeagus, subterminally geniculate, terminally spinose and with a subterminal broad flattened region (Text-figs 78, 124).

The form of the aedeagus and claspers of this and the following genera are quite different from those of the Old World genera to which they were considered to be related. It is possible that these two genera may have evolved quite separately from the Old World 'Podogastrine' genera. This hypothesis is more fully discussed below.

Distribution. This genus is only recorded from the Neotropical region.

Included species. The following have been examined: *P. coarctata* Brullé, *P. striata* (Cameron) and four undescribed species.

Genus **PHILODRYMUS** Townes

Philodrymus Townes, 1971 : 153. Type-species: *Anomalon vitticolle* Cresson, 1874 : 377, by original designation.

Eye with few sparse hairs, margins strongly convergent ventrally; occipital carina complete, close to posterior ocelli; frons without a median vertical carina. Antennae long, those of ♀ without a white band; scape slightly oblique, about 1·0–1·2 times as long as pedicel; fourth flagellar segment about 4·0 times as long as broad. Clypeus with a median apical tooth; mandibles bidentate, apices twisted about 30°, lower tooth distinctly the shorter; labial palpi with three segments; cardo basally lobate. Genal carina present or absent, when present joining hypostomal carina before base of mandible.

Pronotum dorsally moderately long, subvertical, without a distinct transverse furrow, posterior corner not or slightly occluding spiracular sclerite; lower anterior margin of pronotum with a blunt tooth at base of epomia, lower corner truncate. Mesoscutum anteriorly abruptly rounded without an apical concavity; notauli impressed, coriaceous; medio-posterior region of mesoscutum rugose; transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina reaching above centre of mesopleuron, its upper end reaching anterior margin of mesopleuron; epicnemial carina medio-ventrally produced into an acute tooth which projects forward between bases of fore coxae; sternaulus present as an impressed region 0·3–0·6 times as long as mesopleuron; posterior transverse carina of mesosternum complete.

Fore coxae smooth, fore tibial spur with numerous acute macrotrichia along inner face. Mid tibia with two spurs. Hind trochanter about 2·5 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws pectinate almost to apices, not obviously sexually dimorphic.

Forewing with *Rs* almost straight; 2 + 3*rm* proximal to 2*m–cu*; 1*m—cu* and Cu_{1a} basally contiguous; hindwing with 3–5 hamuli on vein R_1; distal abscissa of Cu_1 absent.

BI = 2·00–3·35; DBI = 1·10–1·65; MI = 2·00–3·40; RI = 1·00–1·60; ICI = 0·32–0·55; PI = 6·60–8·00.

Propodeum reticulate, spiracles about 2·5 times as long as broad; posterior of propodeum produced into a sculptured 'neck' that reaches about 0·6 of length of hind coxae, very rarely about 1·00 times as long as hind coxa. Gaster elongate.

♀ genitalia. Valvula 3 about 1·2 times as long as tergite 3; apex of ovipositor constricted, constricted part about 4·0 times as long as median thickness of ovipositor; extreme apex weakly decurved; ovipositor weakly laterally compressed (Text-figs 5, 27, 16).

♂ genitalia. Single syntergum present; ninth abdominal sternite transverse, posteriorly truncate; gonosquamae short, truncate. Gonolacinae distally abruptly curved about 50°; teeth minute; apodeme straight, about 0·5 times as long as basivolsellar strut. Distivolsella slender to moderately broad, basally 0·5–0·6 times as wide as long; clasping face very weakly convex, with transverse ridge bearing teeth. Aedeagal paramere proximally angled, lobate, elongately acute. Aedeagus in profile with apex weakly decurved, apically rounded, membranous; lateral sclerotized region not reaching to apex of aedeagus but subterminally geniculate, spinose, and immediately proximal to geniculation is a broadened flattened region (Text-figs 49, 61, 89, 125).

This genus is very similar, especially in the structure of the genitalia and in wing venation, to *Podogaster*. Only these two genera have the geniculate, partially flattened, apex of the lateral sclerotized aedeagal region. In both genera the distal ends of 1*A* in the forewing is well removed from the weak vannal notch and a small pigmented vein-like area is present extending from the distal end of 1*A* towards and distal to the vannal notch (Text-fig. 195). These genera are also somewhat unusual in having a very reduced number of hamuli on R_1. Even in species with a forewing length of 20 mm in many cases only three hamuli were observed to be present on R_1, whereas in most other genera, where species approach a similar size, there are usually twelve or more hamuli. The only exception to this is *Brachynervus* in which only six hamuli are present, but these are very widely separated, quite unlike those of any other genus.

Philodrymus may be distinguished from *Podogaster* not only in the shape of the propodeum (the character used by Townes) but also in having the eyes less strongly convergent ventrally, having the petiolar spiracles further from the posterior margin of the tergite, and having a shorter ovipositor with a more elongate tip.

DISTRIBUTION. *Philodrymus* is only recorded from the Neotropical region.

INCLUDED SPECIES. The following species have been examined and found referable to this genus:

P. vitticollis (Cresson), *P. minor* (Szépligeti), *P. major* (Szépligeti) and four undescribed species.

Genus ***OPHIONELLUS*** Westwood

Pharsalia Cresson, 1872 : 177. Type-species: *Pharsalia texana* Cresson, 1872 : 177, by subsequent designation (Viereck, 1914*a* : 155). [Homonym of *Pharsalia* Thomson, 1864.]

Ophionellus Westwood, 1874 : 128. Type-species: *Ophionellus fragilis* Westwood, 1874 : 128, by monotypy.

Parophionellus Brues & Richardson, 1913 : 495. [Replacement name for *Pharsalia* Cresson.]
Hymenopharsalia Morley, 1913*a* : 97. [Replacement name for *Pharsalia* Cresson.]

Eye with elongate pubescence, inner margins ventrally strongly convergent; occipital carina close to hind ocelli, complete; frons without a median vertical carina. Antennae of moderate length, those of ♀ occasionally with a white band; scape truncate, 0·8 times as long as pedicel; fourth flagellar segment about 3·0 times as long as broad. Apex of clypeus rounded, truncate, or with median impression; mandibles bidentate, apices weakly twisted, lower tooth distinctly the shorter; labial palpi of three segments; cardo basally lobed. Genal carina joining base of mandible.

Pronotum dorsally long, flat, vertical; posterior corner not or partially occluding spiracular sclerite; lower anterior margin of pronotum with a tubercle at base of epomia; lower corner truncate. Mesoscutum anteriorly very angularly rounded, without a concavity; notauli indistinct; medio-posterior region of mesoscutum coriaceous; transverse suture of mesoscutum present, transverse furrows absent. Epicnemial carina reaching to centre of mesopleuron with upper end joining anterior margin of mesopleuron; epicnemial carina medio-ventrally produced into a weak process; sternauli represented by a flat glabrous area; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with a moderate number of subacuminate macrotrichia on inner face. Mid tibia with one spur. Hind trochanter more than 2·5 times as long as trochantellus; hind tarsi of ♂ not or weakly swollen; hind tarsal claws pectinate almost to apex, not obviously sexually dimorphic.

Forewing with *Rs* short, almost straight; 2 + 3*rm* distal to stub of ?2*m–cu*; 1*m–cu* and Cu_{1a} basally fused. Hindwing with 3–5 hamuli on R_1. Both wings with venation very reduced (Text-fig. 200).

MI = 2·30–2·60; PI = 1·40–1·70.

Propodeum weakly reticulate, spiracles less than 2·0 times as long as broad; posterior of propodeum reaching about 0·6 of length of hind coxae. Gaster exceptionally elongate and slender.

♀ genitalia. Valvula 3 a little longer than apical abdominal depth; apex of ovipositor evenly elongately acutely pointed, extreme apex weakly decurved; ovipositor laterally compressed; valvula 2 with numerous regular perforations (Text-fig. 25).

♂ genitalia. Single syntergum present; ninth abdominal sternite square, posteriorly truncate; gonosquamae elongately extended posteriorly. Gonolaciniae weakly curved about 40°; teeth minute; apodeme straight, 0·2 times as long as basivolsellar strut. Distivolsella broad, 1·0 times as broad as long; clasping face flat, teeth apico-peripherally arranged. Aedeagal paramere proximally acute. Aedeagus laterally weakly curved, apically rounded, dorsally rather uneven; whole of aedeagus rather evenly sclerotized; ergots conspicuous (Text-figs 93, 94, 126).

Ophionellus is one of the most easily distinguishable genera of Ichneumonidae on account of the extremely slender facies of these insects, which are only approached amongst Ichneumonids by some Cremastinae. Other characteristic features of this genus are the reduced venation (Text-fig. 200), the presence of silvery pubescence on the mesopleurae and the elongate gonosquamae of the male.

The female is unusual in having the second valvulae perforated, presumably to reduce weight.

The affinities of this genus are not known at present.

DISTRIBUTION. This genus is mainly Neotropical with a few species in the southern Nearctic region.

INCLUDED SPECIES. The following species were examined and found to be referable to this genus:

O. fragilis Westwood, *O. texana* (Cresson) *O. albofacialis* (Cameron), *O. annulipes* (Cameron), *O. mexicanis* (Morley), *O. virginiensis* (Cresson) and three undescribed species.

Genus ***OPHIOPTERUS*** Brullé

Ophiopterus Brullé, 1846 : 153. Type-species: *Ophiopterus coarctatus* Brullé, 1846 : 153, by monotypy.
Ophionopterus Schultz, 1906 : 96. [Unjustified emendation.]
Ophionopterus Morley, 1912 : 66. [Unjustified emendation.]

Eye with short sparse pubescence or glabrous, inner margins ventrally convergent; occipital carina complete, medio-dorsally convex, close to posterior ocelli; frons without a median vertical carina. Antennae very elongate, those of ♀ with a white band; scape strongly oblique (Text-fig. 172); fourth flagellar segment about 4·0 times as long as broad. Apex of clypeus with a pair of teeth; mandibles bidentate, apices not twisted. lower tooth slightly shorter than upper; labial palps with three segments. Genal carina joining hypostomal carina before base of mandible.

Pronotum dorsally very long, flat, horizontal; posterior corner covering about 0·4 of spiracular sclerite; lower anterior margin with a tubercle at base of epomia; lower corner truncate. Mesoscutum anteriorly evenly rounded, without subapical concavity; notauli absent; medio-posterior region of mesoscutum punctate; transverse suture of mesoscutum present, transverse impressed furrows present. Epicnemial carina short, not reaching above lower 0·4 of mesopleuron and parallel to anterior margin of mesopleuron; epicnemial carina medio-ventrally produced into a large flange; sternaulus indistinct; posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with numerous acute macrotrichia on inner face. Mid tibia with two spurs. Hind trochanter more than 2·0 times as long as trochantellus; hind tarsi of male not swollen; hind tarsal claws pectinate about 0·7 of length, not obviously sexually dimorphic.

Forewing with *Rs* very sinuate; 2 + 3*rm* distal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separated. Hindwing with 6–8 hamuli on R_1; distal abscissa of Cu_1 absent.

CI = 0·58–0·72*; BI = 1·70–1·83*; DBI = 0·85–0·91*; MI = 1·80–1·90*; RI = 1·20–1·35*; ICI = 0·85–0·90*; PI = 1·80–2·00*.

Propodeum reticulate, spiracle more than 2·0 times as long as broad; posterior of propodeum reaching 0·9 of length of hind coxae. Gaster elongate.

♀ genitalia. Valvula 3 as long as tergite 3; apex of ovipositor constricted, constricted part about 4·0 times as long as median thickness of ovipositor; extreme apex straight; ovipositor laterally compressed.

♂ genitalia. Single syntergum present; ninth abdominal sternite quadrate with anterior lateral corners produced (Text-fig. 42) posteriorly truncate; gonosquamae rather short. Gonolaciniae weakly curved distally evenly rounded about 50°; teeth minute; apodeme straight, 0·4 times as long as basivolsellar strut. Distivolsella of moderate width, about 0·55 times as broad basally as long; clasping face flat, teeth apico-peripherally arranged. Aedeagal parameres weakly sclerotized, proximally truncate. Aedeagus laterally almost straight, evenly sclerotized except for apical and ventral regions; entire apex of aedeagus membranous, rounded; ventral membranous region unclearly defined, not extended laterally, but with a median longitudinal fold (Text-fig. 138).

DISTRIBUTION. This very distinctive genus is confined to the Neotropical and extreme southern Nearctic regions.

INCLUDED SPECIES. The following species were examined and found to be referable to this genus:

O. coarctatus Brullé, *O. cincticornis* (Cresson) and one undescribed species.

Tribe **ANOMALONINI** Viereck

Trachynotoidae Foerster, 1868 : 140. Type-genus: *Trachynotus* Gravenhorst (= *Anomalon* Panzer).
Trachynotina Foerster; Thomson, 1887 : 1048.
Trachynotini Foerster; Ashmead, 1894 : 277.
Nototrachini Ashmead, 1900 : 580. Type-genus: *Nototrachys* Marshall (= *Anomalon* Panzer).
Nototrachinae Ashmead; Dalla Torre, 1901 : 177.
Anomaloninae Viereck, 1918 : 72. Type-genus: *Anomalon* Panzer.
Anomalina Townes, 1945 : 708. [Homonym of Anomalitae Blanchard, 1851 : 173.]
Anomalonini Viereck; Hellén, 1950 : 31.
Anomalini Townes; Short, 1959 : 502.

For the diagnostic characters of the tribe see Table 3 (p. 93).

Although strict application of the Law of Priority would favour Trachynotini as the name of this tribe, I have followed all other recent authors in preferring the name Anomalonini. The corrected form Anomalini has not been adopted for the reasons given on p. 6.

Genus ***ANOMALON*** Panzer

Anomalon Panzer, 1804 : 115. Type-species: *Anomalon cruentatus* Panzer, 1804 : 115 [=*Ophion foliator* Fabricius, 1798 : 239], by monotypy.
Trachynotus Gravenhorst, 1829 : 713. Type-species: *Ophion foliator* Fabricius, 1798 : 239, by monotypy. [Homonym of *Trachynotus* Latreille, 1829.]
Nototrachys Marshall, 1872 : 259. [Replacement name for *Trachynotus* Gravenhorst.]
Ophiononeura Cameron, 1904 : 174. Type-species: *Ophiononeura flavomaculata* Cameron, 1904 : 175, by monotypy.
Stictophion Cameron, 1906 : 87. Type-species: *Stictophion rufipes* Cameron, 1906 : 86, by subsequent designation (Viereck, 1914*a* : 138).
Erythrophion Cameron, 1906 : 87. Type-species: *Erythrophion ferrugineus* Cameron, 1906 : 88 [= *Stictophion rufipes* Cameron, 1906 : 86], by monotypy.
Anomalum Schultz, 1906 : 96. [Unjustified emendation.]
Trachyopterus Morley, 1912 : 67. Type-species: *Trachyopterus primus* Morley, 1912 : 68, by monotypy.
Pseudonototrachys Meyer, 1930 : 221. Type-species: *Pseudonototrachys pallidus* Meyer, 1930 : 222 [= *Nototrachis* (sic) *kozlovi* Kokujev, 1915 : 537], by monotypy.
Microcremastus Hedwig, 1961 : 292. Type-species: *Microcremastus amseli* Hedwig, 1961 : 293, by subsequent designation (Townes, 1971 : 125).

Considerable confusion has existed over the use of the generic name *Anomalon* and this has resulted from misinterpretation of the original authorship.

Gravenhorst (1829) used *Anomalon* Jurine, 1807 to include all species now placed in the Therionini. Curtis (1828) designated *Ichneumon laetatorius* F. as the type-species of *Anomalon* Jurine, 1807, although this designation was apparently overlooked by all authors until Viereck (1914). Until the work of Townes *et al.* (1965), authors in western Europe still maintained the use of *Anomalon* Jurine in the Gravenhorstian sense, whilst using *Trachynotus* Gravenhorst for *Anomalon* Panzer, 1804. The argument proposed by Morice & Durrant (1914), suggesting that Curtis's original designation of *I. laetatorius* as the type-species of *Anomalon* Jurine, 1807 was invalid because this species was not included in the anonymous 'Erlangen list' (sometimes attributed to Jurine, 1801), is itself now invalidated. This is because the 'Erlangen list' has been suppressed under the Plenary Powers for nomenclatural purposes by the International Commission on Zoological Nomenclature (Opinion 135, 1939). However the validity of Curtis's designation was questionable because *Anomalon* Jurine, 1807 is merely an interpretation of Panzer's earlier work (1804). In his discussion about *Anomalon*, Jurine includes a list of species that he considers are referable to this genus, cited in original combination. Amongst them he includes *Anomalon cruentatus* Panzer, the type-species of *Anomalon* Panzer, 1804. From this it may be deduced that Jurine was merely expanding Panzer's genus *Anomalon* (including within it all Ichneumonids without an areolet in the forewing) and not proposing a new genus. The designation of a type-species by Curtis may therefore be ignored as spurious since *Anomalon* Jurine, 1807 is not an available name.

Eye usually without pubescence, rarely with short sparse hairs; internal margins of eyes parallel or subparallel; occipital carina complete or centrally interrupted, far removed from posterior ocelli; frons with a median vertical carina. Antennae short, those of ♀ without a white band; scape moderately oblique, about 1·5 times as long as pedicel; flagellar segment 4 about 4·0 times as long as broad. Clypeus either apically rounded, or with a pair of median teeth, sometimes with lower face long so that distance from orbit to mandible base is more than 2·0 times the width of the mandible base; mandible bidentate, lower tooth varying from slightly smaller than upper to vestigial, rarely absent entirely; mandible apices not twisted; labial palps with three segments; cardo basally simple. Genal carina either reaching base of mandible or joining hypostomal carina.

Pronotum dorsally long, with anterior part horizontal and posterior part subvertical and therefore with a median transverse angulation; posterior corner of pronotum not occluding spiracular sclerite; lower anterior margin without a tooth, lower corner truncate. Mesoscutum steeply rounded anteriorly, without a concavity; notauli weak to strong; medio-posterior region of mesoscutum coriaceous; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina reaching above centre of mesopleuron, its upper end reaching anterior margin of mesopleuron; epicnemial carina medio-ventrally raised into a flange; sternauli usually absent, rarely impressed, but not reaching beyond centre of mesopleuron. Posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with a moderate number of truncate macrotrichia along inner face. Mid tibia with a single apical spur. Hind trochanter more than 1·3 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws long, weakly curved, basally pectinate.

Forewing with *Rs* sinuate; 2 + 3*rm* distal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separated; unusual in having abscissa of Cu_1 between 1*m–cu* and Cu_{1a} angled at less than 35° to first abscissa of Cu_1. Hindwing with 5–11 hamuli on R_1; distal abscissa of Cu_1 absent.

CI = 0·55–0·62; BI = 1·25–1·45; DBI = 0·50–0·63; MI = 1·50–1·93; RI = 1·15–1·30; PI = 1·90–2·45; ICI = 0·80–1·10.

Propodeum weakly reticulate, in profile unusual in being convexly rounded and not posteriorly produced; spiracles about 3·0 times as long as broad. Gaster elongate, unusual in having tergite 3 with epipleuron separated by a longitudinal crease.

♀ genitalia. Valvula 3 from as long as tergite 3 to as long as gaster; apex of ovipositor elongately and simply acute, extreme apex not decurved; ovipositor not laterally compressed (Text-figs 4, 8, 22).

♂ genitalia. Single syntergum present; ninth abdominal sternite quadrate, posteriorly angularly rounded; gonosquamae short, obliquely truncate. Gonolaciniae distally evenly rounded about 45°; teeth absent; apodeme straight, extended about 0·6 of length of basivolsellar strut. Distivolsella slender, basally about 0·3 times as wide as long; clasping face flat, teeth arranged periphero-diagonally. Aedeagal paramere proximally spatulate, truncate. Aedeagus in profile almost straight, apically rounded, dorsally concave so that there is an apico-dorsal prominence; aedeagus weakly and rather evenly sclerotized, apico-lateral region united medio-ventrally and produced proximally into a weak spine; lateral sclerotized region indistinctly defined apically; aedeagus not laterally extended (Text-figs 50, 67, 86).

Anomalon species are often very common in dry areas. Morphologically the species are very uniform except for some striking variations of a very few characters. The facial structure is particularly variable. The most extreme modification occurs in *A. rufipes* which has a very broad malar space with the face correspondingly elongate (Text-fig. 168) and the mandibles unidentate. Reduction of the lower mandibular tooth is an occurrence not uncommon amongst the Anomaloninae, as it has been observed to occur in many genera including *Anomalon*, *Habronyx* (*Austranomalon*), *Aubertiana*, *Atrometoides* and *Gravenhorstia* (*Erigorgus*). In the latter genera there is also reduction of the clypeus until, in extreme examples, the clypeal apex is concave. The functional significance of these modifications is not clear but it is noteworthy that this modification is most apparent in species of arid regions, *A. unidentator* and *Atrometoides winkleri* of the North Sahara, *Anomalon rufipes* of the Kalahari, *H.* (*Austranomalon*) from central Australia and *G.* (*Erigorgus*) *nigrita* from the Sonoran regions. Undoubedly one of the most important physical factors affecting insect distribution is the availability of water. It is considered possible that these modifications of the mouthparts may enable the Ichneumonids to obtain moisture from a source not available to those with the more normal mouthparts (that is shorter bidentate mandibles and large, centrally pointed clypeus). *A. rufipes* is also characterized by the swollen tibiae, which on the outer and posterior surfaces bear numerous flattened macrotrichia. These two obvious differences make *A. rufipes* a very distinct species but it does not justify the retention of a separate genus, *Stictophion*, as examination of a number of related species has revealed a continuous series of variation in the shape of the face and tibia, from the *Anomalon foliator*-type (Text-fig. 169) (short malar space and tibiae not swollen) to *A. rufipes*.

The wing venation is usually very constant throughout this genus but one New Guinea species, *A. taparilense*, entirely lacks vein *2m–cu*.

The final instar larvae of this genus are unusual in having mandibles bearing teeth.

The species of this genus are recorded as parasites of the larvae of Tenebrionidae.

Distribution. This is a cosmopolitan genus with species most numerous in drier regions.

Included species. The following species were examined and found to be referable to this genus:

A. foliator (F.), *A. australense* (Morley), *A. californicum* (Cresson), *A. formosanum* (Uchida), *A. frontale* (Cushman), *A. novoguineense* (Szépligeti), *A. variistriatum* (Morley), *A. ejuncidum* Say, *A. fuscipes* (Cameron), *A. primum* (Morley), *A. sinuatum* (Morley), *A. striatifrons* (Morley), *A. taparilense* Cheesman, *A. flavomaculatum* (Cameron), *A. nirvanum* (Morley), *A. rufipes* (Cameron), *A. tisisthenes* (Morley) and a large number of undescribed species.

Genus *NEOGREENIA* Viereck

Neogreenia Viereck, 1912*a* : 641. Type-species: *Neogreenia picticornis* Viereck, 1912*a* : 642, by original designation.

Eye surface with a few scattered hairs, inner margins weakly to moderately convergent ventrally; occipital carina usually broadly interrupted centrally, sometimes absent, remote from posterior ocelli; frons with or without a median vertical carina. Antennae short, those of ♀ usually with a white band; scape truncate, about 1·2 times as long as pedicel; fourth flagellar segment about 4·5 times as long as broad. Clypeus apically rounded or with a pair of median teeth; mandible bidentate, lower tooth distinctly the shorter; mandibular apices not twisted; labial palps with three segments. Genal carina meeting hypostomal carina near base of mandible.

Pronotum dorsally moderately long, subvertical, with a transverse furrow; posterior corner of pronotum not occluding spiracular sclerite; lower anterior margin without a tooth, lower corner truncate. Mesoscutum anteriorly abruptly rounded, without a concavity; notauli impressed, usually reaching beyond centre of mesoscutum; medio-posterior region of mesoscutum punctate to rugose; transverse suture of mesoscutum absent, transverse furrows absent. Epicnemial carina strong, reaching anterior margin of mesopleuron above the centre of the mesopleuron; epicnemial carina medio-ventrally raised into a flange; sternaulus distinct, extending more than 0·4 of length of mesopleuron. Posterior transverse carina of mesosternum complete.

Fore coxae smooth; fore tibial spur with many subacute macrotrichia on inner face. Mid tibia with a single spur. Hind trochanter more than 2·0 times as long as trochantellus; hind tarsi of ♂ not swollen; hind tarsal claws short, curved, basally pectinate.

Forewing with *Rs* almost straight to sinuate; 2 + 3*rm* absent or very short, when present distal to 2*m–cu*; 1*m–cu* and Cu_{1a} basally separated. Hindwing with 3–5 hamuli on R_1; distal abscissa of Cu_1 absent.

CI = 0·10–0·25; BI = 1·10–1·25; DBI = 0·55–0·64; MI = 1·70–2·35; RI = 0·30–0·40; PI = 1·30–1·52; ICI = 0·2–.

Propodeum reticulate; spiracle more than 3·0 times as long as broad; posterior of propodeum reaching about 0·1 of length of hind coxae. Gaster elongate, tergite 3 with epipleuron separated by a crease.

♀ genitalia. Valvula 3 about 1·3–1·6 times as long as tergite 3; ovipositor apically simply elongately acute, extreme apex not decurved; ovipositor weakly laterally compressed.

♂ genitalia. Very similar to *Anomalon* but with aedeagus apically membranous, rounded and without posteriorly directed ventral sclerotized process.

This genus is undoubtedly very closely related to *Anomalon* and Townes (1971 : 124) is of the opinion that *Neogreenia* is hardly more than a distinct species-group. In addition to the differences noted by Townes, *Neogreenia* differs from *Anomalon* in the value of RI and in lacking the ventral aedeagal process. It has therefore been decided to retain *Neogreenia* as a distinct genus.

Distribution. This genus is restricted to the New World.

Included species. The following species have been examined and found to be referable to this genus:

N. picticornis Viereck, *N. concolor* (Szépligeti), *N. levipectus* (Enderlein), *N. minima* (Ashmead) and also two undescribed species from South America.

INTERGENERIC RELATIONSHIPS

As a result of the detailed study of the morphology of the Anomaloninae, the results of which have been included above, it is possible to examine critically intergeneric relationships, such as the suprageneric classification, and to propose a possible evolutionary scheme for the group.

Possible evolutionary interrelationships

Very few fossil species of Anomaloninae have been described. Brues (1910) described a number of species referable to four genera, *Gravenhorstia* (*Anomalon* sensu Gravenhorst), *Barylypa*, *Therion* and *Hiatensor*. The latter genus is known only from two fossil species. Because of this rarity of fossil material any attempt to assess evolutionary interrelationships must be almost entirely based on comparative morphology of modern species. Unlike the phenetic investigation described below, a phylogenic investigation relies on the selection of certain characters as being of greater evolutionary importance than others, and it is in this selection of characters that the greatest errors in a proposed system of phylogeny may be created.

Certain features amongst the Anomaloninae may be considered to be more primitive characters. Townes (1969) characterized the Anomaloninae by the complete absence in the final instar larva of the hypostomal spur. This observation has been found to be correct for the majority of Anomaloninae examined. However, *Habronyx* subgenus *Habronyx* species have been found to have a vestigial hypostomal spur. Presence of this spur may be considered as a primitive condition.

The majority of Ichneumonidae have the bases of veins Cu_{1a} and $1m\text{–}cu$ of the forewing separate, although there is a tendency amongst some Anomaloninae to have these veins basally fused. Separation of these veins basally may be regarded as a less advanced condition. In more primitive Hymenoptera there is usually a large number of hamuli on vein R_1 of the hind wing. Loss of hamuli can be considered to be a more advanced feature. Likewise the reduction of the lower mandibular tooth and the number of palpar segments may be regarded as derived features, although there is no evidence to suggest that such atrophication has occurred only once in the evolution of the Anomaloninae.

Considering these features together it appears that the group of genera *Habronyx*, *Gravenhorstia* and *Aphanistes* are the most primitive and this deduction is supported by the little available fossil evidence. Interpretation of the evidence for the interrelationship of these genera is not easy and often evidence is somewhat ambiguous, but a tentative scheme of interrelationship is shown in Text-fig. 250. Amongst the more primitive Anomaloninae there has been two evolutionary pathways. One pathway has involved specialization of the egg development, of the lobed cardo and loss of the sexually dimorphic claws. Notauli have been retained. Near the base of this line of evolution must be *Habronyx heros* which maintains the reduced hypostomal spurs in the larval stage. This species is clearly related to the other *Habronyx* (*Habronyx*) species which show progressive enlargement of the dorsal area of the aedeagus, simplification of the tarsal claws and reduction of the length of the propodeum. There is some tendency within this group for an increase in the value of BDI.

Probably the primitive Tasmanian *Heteropelma* species, *Heteropelma flavitarse* (which lacks the geniculate tarsal claws), is related to this evolutionary sequence. This line of development shows the retention of the specialized egg form, retention of the slender apically swollen distivolsella and retention of the broad larval pleurostoma as well as an increase in the development of a pronotal tooth and reduction of the membranous areas of the aedeagus. *H. flavitarse* is clearly related to *H. scaposum* but the latter has strongly geniculate hind tarsal claws. There are two apparent lines of evolution within *Heteropelma*. One shows increasing modification of the hind tarsi but retains the simply rounded clypeus whilst the other shows elaboration of the apico-clypeal region. *H. perornatum* is a rather specialized offshoot of the former which exhibits reduction in the size of the head and atrophication of the tibial spurs.

Another evolutionary interrelationship is that between *H. heros* and *H.* (*Camposcopus*) *nigricornis*. This sequence shows reduction of the cephalic capsule of the larva and a decrease in values of CI and TI. The relationship of these with *H.* (*Habrocampulum*) is not clear.

Aphanistes is related to the *Habronyx* species but has lost the caudal stalk of the egg though retaining the equatorial sucker (Text-fig. 99). This group shows progressive reduction in the size of the apico-dorsal membranous region of the aedeagus but exhibits stability in the positioning of 2 + 3*rm* and the structure of the mouthparts.

The other major evolutionary sequence has not involved specialization of the egg or cardo but has retained the sexually dimorphic claws and shows reduction of the notauli. The aedeagus of this group shows a tendency to develop an increasingly large apical lobe. This group retains a tendency for variation in the mouthparts and position of 2 + 3*rm* to occur.

Habronyx (*Austranomalon*) is an offshoot of this line but retains notauli. The remaining groups have completely lost the notauli. The interrelationship of the other subgenera can clearly be observed (Text-fig. 250).

The relationship of *Barylypa*/*Corsoncus* with the other genera is not particularly clear but it is possibly most closely related to *Habronyx* (*Austranomalon*). There are similarities between these two groups including the reduction of notauli, loss of apical clypeal tooth in some species, the decrease in value of CI and the lack of a strongly curved hypostoma in the larvae.

A relationship not shown in the figure is that of the above mentioned genera to *Therion* and *Trichomma*. These genera are clearly related to the *Habronyx*/*Heteropelma* line of evolution in retaining a specialized egg, large pleurostoma etc. They differ in having dissimilar aedeagi. However, *Therion*, *Trichomma*, *Heteropelma* and *Tanypelma* all have the gonolacinial apodeme formed from a sclerotized part of the outer margin of the gonolacinia (Text-figs 52, 55, 56, 57) and have similarly positioned teeth although these teeth are reduced to ridges in the genera *Trichomma* and *Tanypelma*. Despite the similarities between these genera it is evident that whilst *Tanypelma* and *Heteropelma* are very closely related, *Trichomma* and *Therion* have been evolving separately from the other two for a considerable time (Brues, 1910).

The position of the remainder of the genera in relation to those discussed is not clear. Although *Agrypon* is superficially similar to *Barylypa*, there are marked differences in the form of the genitalia and cephalic capsule of the final instar larva. A few species of *Agrypon* (*A. clandestinum* for example) have a specialized egg indicating that, unlike *Barylypa*, species of this group are probably related to the *Habronyx* stock.

The interrelationship between the 'Podogastrine' genera is not clearly understood at present. *Clatha* and *Atrometus* have similarly modified claspers and are undoubtedly closely interrelated. Both these genera are unusual in having the gonolaciniar apodeme joining the inner edge of the gonolacinia and having the outer edge free (Text-figs 34, 53, 54, 58). This condition is also found in the genera *Parania* and *Spolas*. In all other 'Podogastrine' genera the gonolacinial apodeme is attached broadly to the entire base of the gonolacinia. The positioning of the gonolacinial teeth is similar in the genera *Clatha*, *Atrometus*, *Parania* and to a lesser extent *Spolas* which has rather small teeth. The positioning of the distivolsellar teeth is quite different in the latter genus. These four genera also have somewhat similar aedeagi. It is suggested that there may be a closer phylogenic relationship between these four genera than there is between *Clatha* and *Atrometus* and the other 'Podogastrine' genera. The remaining genera all have the aedeagal apices weakly convex and in the genera *Cechenodes*, *Vernamalon* and *Brachynervus* the ventral area is weakly expanded laterally into triangular flanges. The gonolacinia of *Vernamalon* and *Cechenodes* are similar in having a sclerotized process near the base of the gonolacinial apodeme.

Podogaster and *Philodrymus* are very closely related genera but the affinity between them and the Old World genera is not at all clear. There are several very obvious differences between the two groups, including the shape of the aedeagus, structure of the claspers, the number of hamuli, the form of the ovipositor apex and the development of sternauli. It is possible that the Neotropical genera are not as closely related to the Old Word genera as has been implied by including them together within a single tribe. The mesoscutal suture may have arisen independently within several different evolutionary lines. Until the species are better collected and more extensively studied little progress can be made in this sphere of investigation.

Suprageneric classification

The most recent system of classification of the Anomaloninae is that of Townes (1971) who divides the subfamily into four tribes, the Anomal[on]ini, Theriini, Podogastrini and Gravenhorstiini. Of these tribes only the Anomalonini have been found to be a distinct group.

The Anomalonini have been separated from the remainder (collectively called the Therionini) because of a number of differences. Several of these differences, though widely used, have been invalidated as a result of more recent work. The features by which the Anomalonini differ from the Therionini are given in Table 3.

Some of the morphological differences may be due to the dissimilar biologies of the Anomalonini and Therionini. The former are parasites of the larvae of

Coleoptera, especially Tenebrionidae, whereas the latter are parasites of lepidopterous larvae. Considering the combination of features of the Anomalonini as a whole it is evident that although they are similar in some respects to the Therionini, they represent a distinct and quite separate tribe. The present system of classification, that is to accord the Anomalonini, Theriini, Podogastrini and Gravenhorstiini equivalent taxonomic rank, does not accurately represent the phylogeny of the group as a whole. It can be deduced from the dendrogram (Text-fig. 249) and from Table 3 that the latter three tribes are more closely interrelated than any one is to the Anomalonini. It is therefore suggested that the groups Theriini, Gravenhorstiini and Podogastrini should all be included within a single tribe, the Therionini and that the Anomaloninae be composed of the two tribes Anomalonini and Therionini.

It can be seen from the dendrogram that the separation of the groups Theriini, Podogastrini and Gravenhorstiini within the Therionini is not at all clear. The Therionini divides initially into two groups at the 69 percentage similarity coefficient. One group contains thirteen genera, including part of the Theriini (that is *Therion*, *Heteropelma* and *Tanypelma*) and the majority of Gravenhorstiine genera but none of the Podogastrini. The second group contains fourteen genera and includes all of the Podogastrine genera and a few of the Gravenhorstiine genera (*Spolas*, *Metoa*, *Perisphincter*, *Phaenolabrorychus*, *Agrypon* and *Parania*).

Further examination shows that the first group divides into four subgroups before the 77 percentage similarity coefficient. One of these subgroups contains a single genus *Trichomma*, a second contains the Theriine genera (excluding *Brachynervus*), a third contains the genera *Clypeocampulum* and *Encardia*, while a fourth contains the majority of Gravenhorstiine genera. The second major group contains a less closely interrelated group of genera which show less tendency to cluster into subgroups which divide before the 77 percentage similarity coefficient into four. Two of these subgroups each contain a single genus, *Ophiopterus* and *Ophionellus* respectively, a third subgroup contains two genera, *Podogaster* and *Philodrymus*, and the fourth contains the remaining genera including all the 'Gravenhorstiine' genera placed in the group and the Old World 'Podogastrine' genera. More conventional examination of specimens has shown that the limits of the Theriini, Podogastrini and Gravenhorstiini are not easily definible and it is suggested that the system of dividing the Therionini into three groups should not be employed as it does not accurately represent the phylogeny of the group as a whole when all available evidence is considered.

Systematic position of the subfamily

There is considerable controversy over the systematic position of the Anomaloninae. Two interpretations are prevalent. Townes and co-workers (1961; 1965; 1966; 1969; 1971; 1973), basing their interpretation on the evidence of Short (1959), place the Anomaloninae adjacent to the Metopiinae. The second interpretation, that of the majority of European workers, Perkins (1959), Aubert (1966) and Viktorov (1968), retains the Anomaloninae within the Ophioninae.

TABLE 3

Comparison of the Anomalonini and Therionini

ANOMALONINI	THERIONINI
Valvula three longer than third tergite; valvifer two without dorsal apodeme.	Valvula three usually shorter than third tergite; valvifer two with a dorsal apodeme.
Clypeus rounded or bilobate.	Clypeus usually with a median point, rarely rounded, truncate, concave or bilobate.
Final instar larvae with mandibles with several teeth; parasitic upon coleopterous larvae.	Final instar larvae with mandibles simple; parasitic upon lepidopterous larvae.
Nervellus never intercepted and mid tibia unicalcarate.	Nervellus often intercepted and mid tibia, except in few rare genera, bicalcarate.
Propodeum only slightly extended beyond insertion of hind coxae.	Propodeum usually markedly extended beyond insertion of hind coxae.
Epipleuron of tergite three separated by a longitudinal crease.	Epipleuron of tergite three not separated by a longitudinal crease.

Short noted that the cephalic capsules of the final instar larvae of Anomaloninae are very similar to those of some Metopiinae. Both are similar in having large mandibles, a complete epistomal arch (not in some *Triclistus* species) and lack a hypostomal spur (with at the most a vestige present in *Habronyx* and *Gravenhorstia*). This similarity is the basis of the Townes interpretation of the position of the Anomaloninae. Reduction of the hypostomal spur has been observed in other subfamilies, notably the Ichneumoninae, Orthopelmatinae and Collyriinae. The loss of hypostomal spur can be correlated with the habits of the final instar larvae. Those which construct cocoons invariably have a well developed hypostomal spur whereas those that pupate in the host puparium, spinning only a flimsy cocoon, have the hypostomal spur reduced or absent.

The adult Anomaloninae are morphologically distinct from the Metopiinae. The former have the clypeus separated from the face by a distinct impression, have the petiole slender with the spiracles near the posterior margin, have all trochantelli differentiated, have the gaster compressed and usually have a subapical notch present on the ovipositor. The latter have the clypeus and face confluent, have the petiole broad with the spiracles at or anterior to the centre, do not have the fore and mid trochantelli differentiated and usually lack a subapical notch on the ovipositor. It is possible that the striking differences between adult Metopiinae and Anomaloninae may have resulted from dissimilarities in biology. The Metopiinae are adapted to mimic some Aculeates (*Metopius* for example mimics Eumenine wasps) whereas the bodies of most Anomaloninae are modified for concealment. Specimens of

Heteropelma calcator resting on conifers are very difficult to see. These differences in form are emphasized by behavioural differences. When taken in a sweep net, Metopiines buzz aggressively but Anomalonines usually remain motionless, often grasping a conifer twig and elevating the slender gaster at an angle approximately the same as that subtended by the leaves on the twig. Some species of *Gravenhorstia* are brightly coloured wasp mimics, but these species are not as slender as the majority of Anomaloninae, they are nonetheless quite unlike Metopiinae in body form.

The adult Anomaloninae are morphologically similar to the Ophioninae in a number of ways, such as the abdominal shape, form of the ovipositor and structure of the male genitalia. This similarity is the basis of the argument to retain the Anomaloninae within the Ophioninae. The cephalic capsules of the final instar larvae of Ophioninae differ considerably from those of the Anomaloninae in having an incomplete epistomal arch, minute mandibles and well developed hypostomal spurs. Unlike the Anomaloninae the Ophioninae complete their development outside the host pupa in a thick cocoon which the larva spins. Such a difference in biology could be the reason why the final instar larvae of the two groups are so dissimilar.

Little is known about the structure of the first instar larvae of any group of Ichneumonidae. Members of all three subfamilies (except for the Anomalonini) are recorded as parasites of similar ranges of lepidopterous hosts. In the majority of species the first instar larva lives within the haemocoel of the host. If there were a phylogenic affinity between any of the subfamilies it might be reasonable to suppose that there would be similarities between the first instar larvae. The first instar larvae of Metopiinae are quite different from those of the Anomaloninae or Ophioninae in having sharp L-shaped mandibles and lacking a caudal appendage (Gerig, 1960). The larvae of Anomaloninae and Ophioninae (and also some other subfamilies formerly included within the Ophioninae, the Porizontinae and Cremastinae) are characterized by an elongate caudal appendage (Plotnikov, 1914). The mandibles of the first instar larvae of Anomaloninae resemble the Ophioninae and Porizontinae in having large basal condyles but are distinct in having only a very short blunt tooth.

From the evidence presented above it can be concluded that the Anomaloninae are not related to the Metopiinae and that the similarity in the structure of the final instar larval head capsule is the result of evolutionary convergence. The Anomaloninae show some similarities to the Ophioninae and other subfamilies previously included within this subfamily and these similarities may be considered to indicate phylogenic affinity between the groups. However, as the Anomaloninae are distinct from the Ophioninae in a number of ways (Table 4) it is suggested that they should be retained as a separate subfamily but placed adjacent to the Ophioninae and Porizontinae.

UNPLACED SPECIMENS

During the preceding work it was not possible to place all specimens examined into the defined genera. The two unplaced specimens are considered to belong

TABLE 4

A comparison of some critical features of the subfamilies
Metopiinae, Anomaloninae and Ophioninae

METOPIINAE	ANOMALONINAE	OPHIONINAE
Gaster dorso-ventrally flattened, first tergite broad, not elongate, with a pair of longitudinal carinae.	Gaster laterally compressed, first tergite elongate, simple and with spiracles near posterior margin.	Gaster laterally compressed, first tergite elongate, simple and with spiracles behind the centre.
Fore and mid legs with a single trochanteral segment.	All legs with two trochanteral segments.	All legs with two trochanteral segments.
Propodeum regularly carinate, with area superomedia distinct; posteriorly not extended far beyond insertion of hind coxae.	Propodeum irregularly carinate or reticulate, area superomedia not clearly defined; extended posteriorly into a neck beyond the insertion of the hind coxae.	Propodeum regularly or incompletely carinate, area superomedia present or absent; posteriorly extended but a little beyond the insertion of hind coxae.
Ovipositor without an apical constriction or subterminal notch.	Ovipositor apically constricted, usually with a subterminal notch.	Ovipositor not apically constricted but with a subterminal notch.
Wings large; forewing without an extra vein between vannal notch and tornus, disco-submarginal cell with evenly distributed microtrichia; anterior distal corner of first subdiscal cell with Cu_1 angled at emission of 1*m–cu* at 130° or less.	Wings small, often with wingspan less than body length; forewing without an extra vein; discosubmarginal cell with evenly distributed microtrichia; anterior distal corner of first subdiscal cell with Cu_1 angled at emission of 1*m–cu* at 125° or less.	Wings very large; forewing with an extra vein extending from the vannal notch to tornus; discosubmarginal cell with glabrous areas; anterior distal corner of first subdiscal cell with Cu_1 angled at emission of 1*m–cu* at 145° or more.
Penis valve simple, elongately saggitate, without membranous region and with ergots quadrate.	Penis valve lobulate, explanate, with membranous regions and with ergots triangular.	Penis valve simple, elongate, terminally rounded, without a membranous region and with ergots triangular.
Ventral area of basivolsella membranous; distivolsella discrete, with small bipartite apodeme; basivolsellar strut large, sclerotized; gonolacinia weakly curved, terminally dentate.	Ventral area of basivolsella sclerotized, fused to distivolsella; distivolsellar apodeme conspicuous; basivolsellar strut weak; gonolacinia usually markedly curved, distally weakly dentate.	Ventral area of basivolsella somewhat sclerotized, fused to distivolsella; distivolsellar apodeme reduced; basivolsellar strut weak; gonolacinia strongly curved and elongately pointed.
Egg not exceptionally small, 0·3–0·9 mm long; final instar larvae with epistomal arch complete, hypostomal spur absent, mandibles large and pointed; completes development in host pupa, forms only thin cocoon.	Egg very small, 0·20–0·45 mm long; final instar larvae with epistomal arch complete, hypostomal spur vestigial or absent, mandibles large and pointed; completes development in host pupa, forms only thin cocoon.	Egg not small, 1·2–1·8 mm long; final instar larva with incomplete epistomal arch, hypostomal spur present, mandibles reduced in size; completes development in thick cocoon, typically pale banded.

to undescribed genera, but as in each case only a single specimen is known nothing further has been done other than to note their existence.

Species A. St. Helena: Knollcombes, 16.x.1959 (*C. R. Wallace*), BMNH. 1 ♂ similar to *Trichomma* species except that pubescence of eye is very short, clypeus is apically truncate, mandibular teeth are equal in length, propodeal spiracle is circular, scutellum is very convex and tarsal claws are short with large sparse pectinations extending to apex.

Species B. Pahang: Cameron Highlands, 1.ii.1968 (*C. G. Roche*), BMNH. 1 ♀ similar to *Agrypon* species with fore coxae without carinae, with mesoscutum with a transverse suture, and clypeus apically angled with a median apical tooth This species is exceptional in having large tentorial pits, which have a diameter exceeding the breadth of the malar space, and in having the ovipositor decurved, elongately and evenly tapered and without a trace of a dorsal notch so that the organ appears in side view, not unlike a sailmaker's needle.

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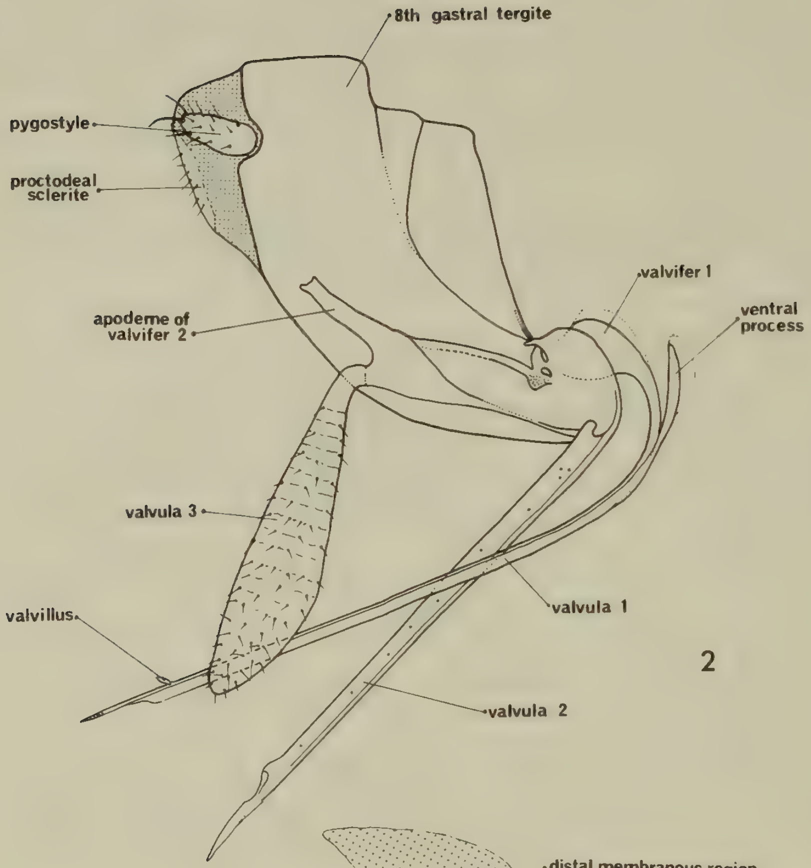
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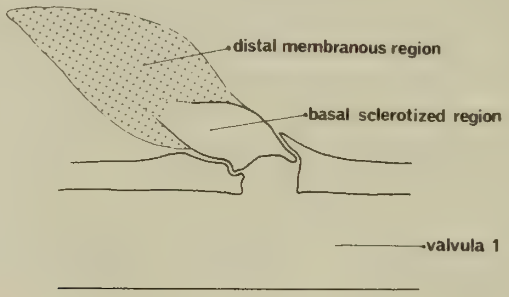
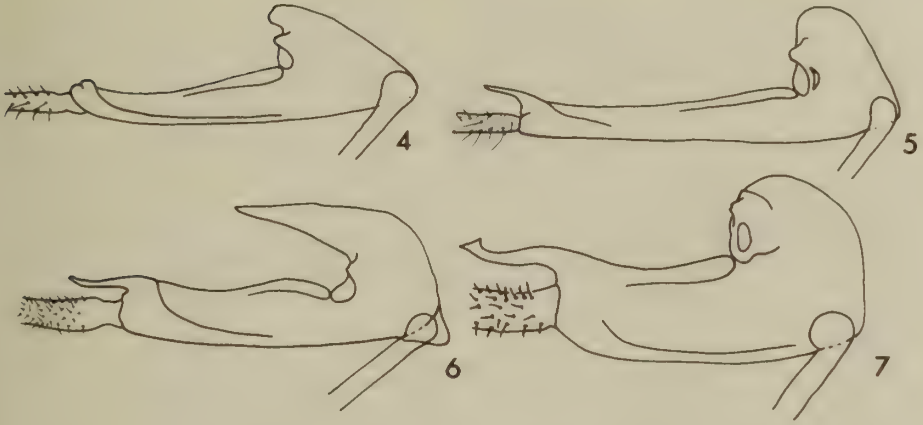
2

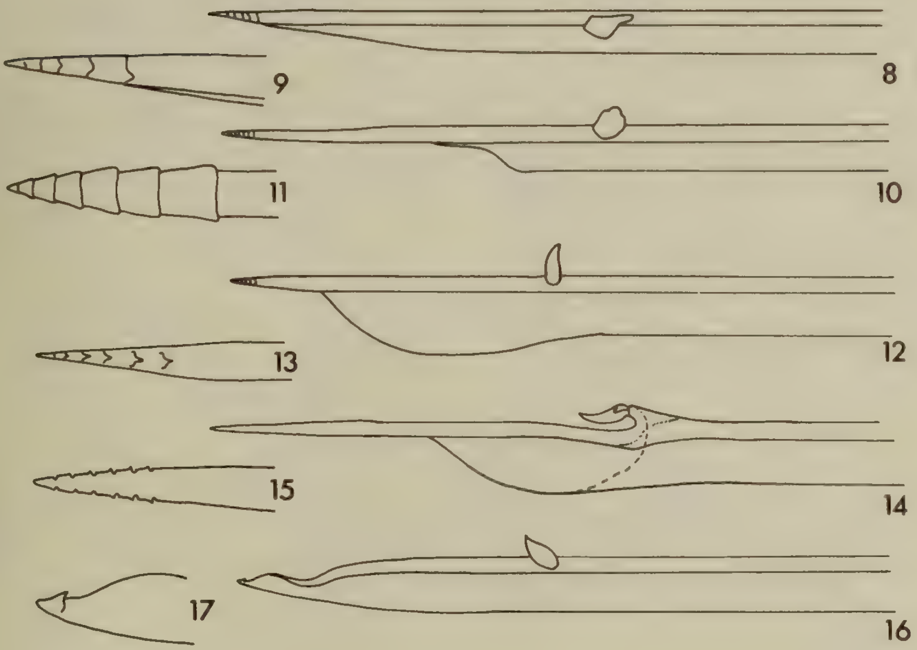

distal membranous region
basal sclerotized region
valvula 1

3

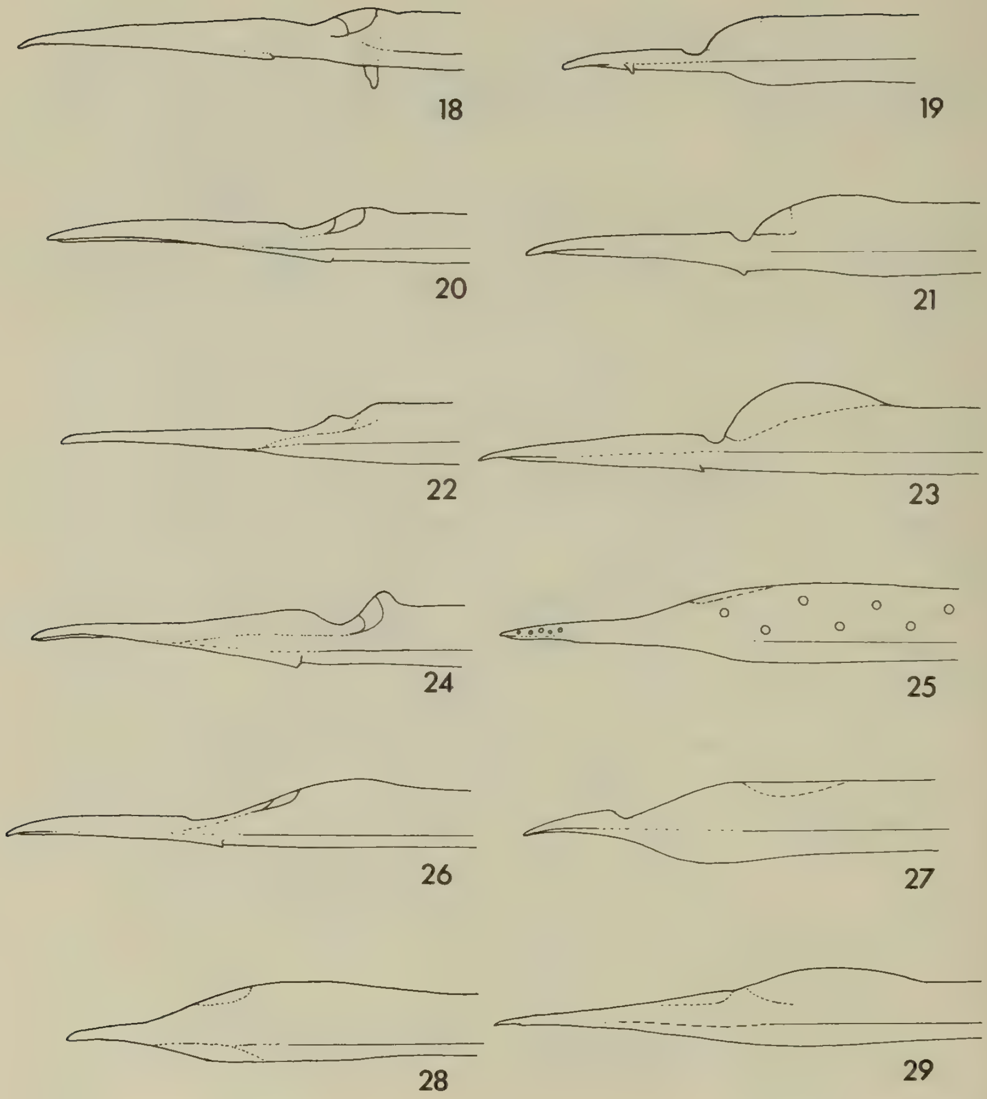
FIGS 2, 3. *Heteropelma calcator* Wesmael. 2, female terminalia; 3, valvillus.



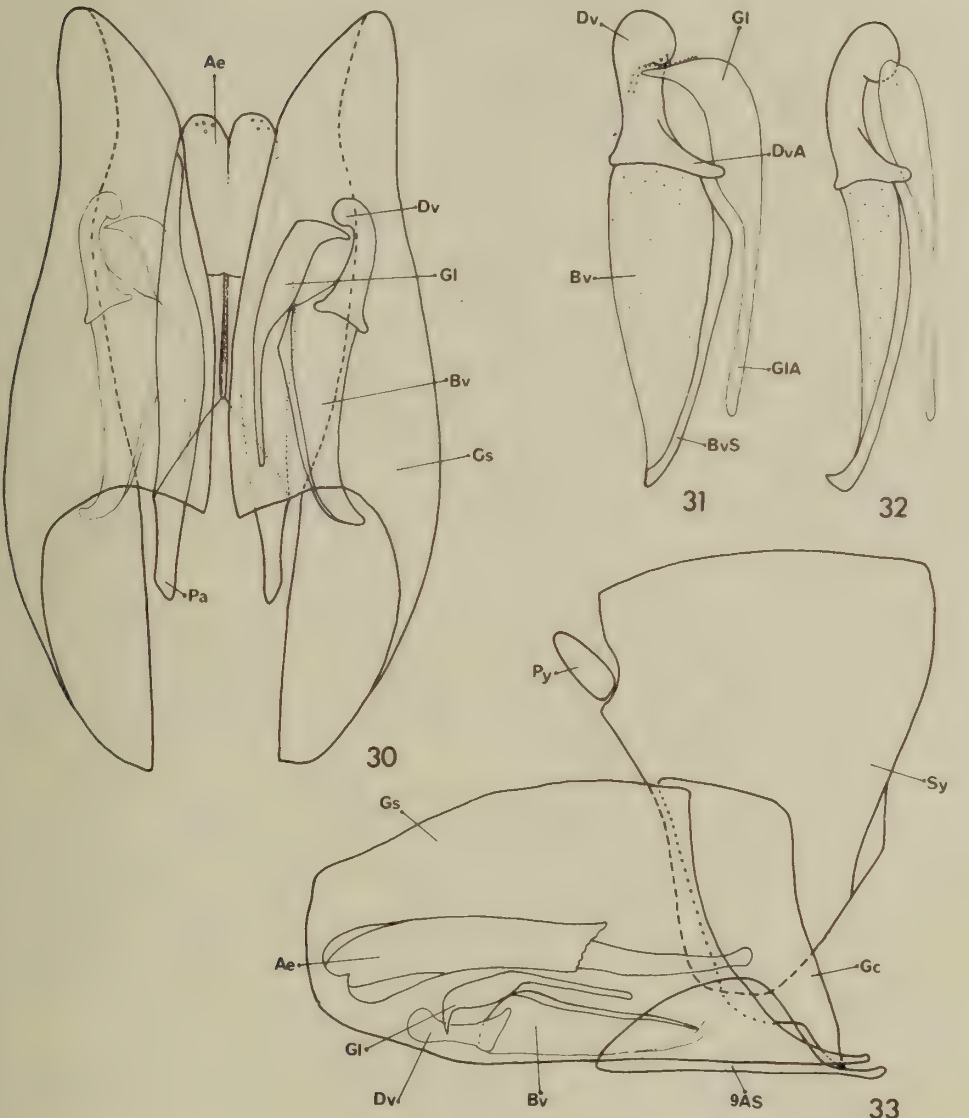
FIGS 4–7. Valvifers 2, lateral view. 4, *Anomalon foliator* (F.); 5, *Philodrymus vitticollis* (Cresson); 6, *Pseudanomalon gracile* Szépligeti; 7, *Parania tricolor* (Szépligeti).



FIGS 8–17. Distal ends of valvulae 1. 8, *Anomalon foliator* (F.); 9, the same, apex enlarged; 10, *Therion circumflexum* (L.); 11, the same, apex, enlarged; 12, *Parania tricolor* (Szépligeti); 13, the same, apex enlarged; 14, *Pseudanomalon gracile* Szépligeti; 15, the same, apex enlarged; 16, *Philodrymus vitticollis* (Cresson); 17, the same, apex enlarged.



FIGS 18–29. Valvulae 2, apices, lateral view. 18, *Heteropelma amictum* (F.); 19, *Barylypa humeralis* Brauns; 20, *Trichomma fulvidens* Wesmael; 21, *Aphanistes xanthopus* (Schrank); 22, *Anomalon foliator* (F.); 23, *Gravenhorstia* (*Erigorgus*) *cerinops* (Gravenhorst); 24, *Therion circumflexum* (L.); 25, *Ophionellus fragilis* Westwood; 26, *Agrypon anxium* (Wesmael); 27, *Philodrymus vitticollis* (Cresson); 28, *Pseudanomalon gracile* Szépligeti; 29, *Parania tricolor* (Szépligeti).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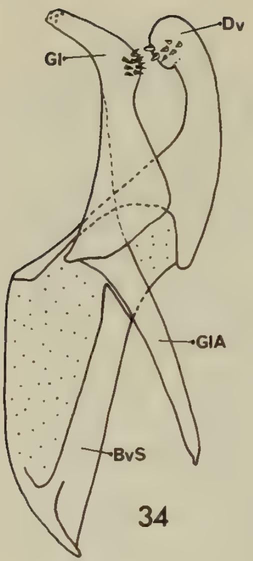
FIGS 30–33. Male terminalia of *Heteropelma amictum* (F.). 30, genital capsule, ventral view; 31, clasper, lateral view; 32, the same, dorsal view; 33, genital capsule and supporting sclerites, lateral view (right half not shown). Abbreviations used in figures: Ae aedeagus; 9AS ninth abdominal sternite; Bv basivolsella; BvS basivolsellar strut; Dv distivolsella; DvA distivolsellar apodeme; Gc gonocardo; Gl gonolacinia; GlA gonolaciniar apodeme; GS gonosquama; Pa paramere; Py pygostyle; Sy syntergum.



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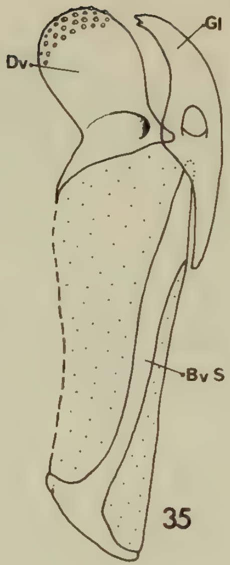

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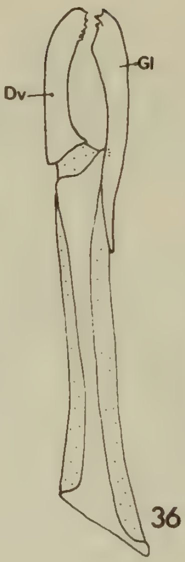

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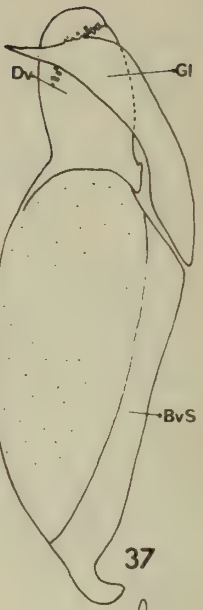

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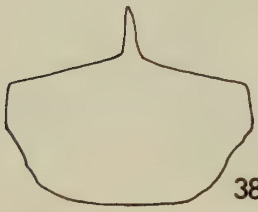

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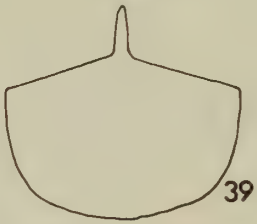

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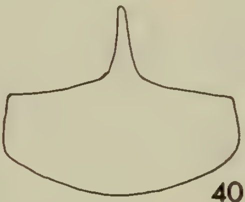

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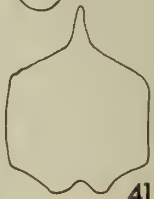

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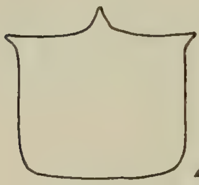

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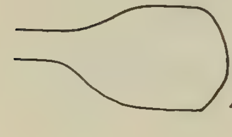

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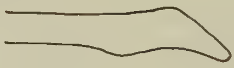

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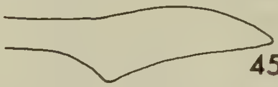

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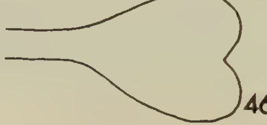

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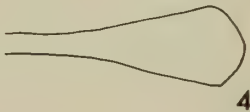

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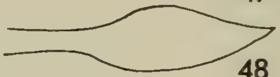

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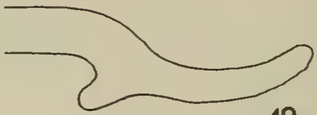

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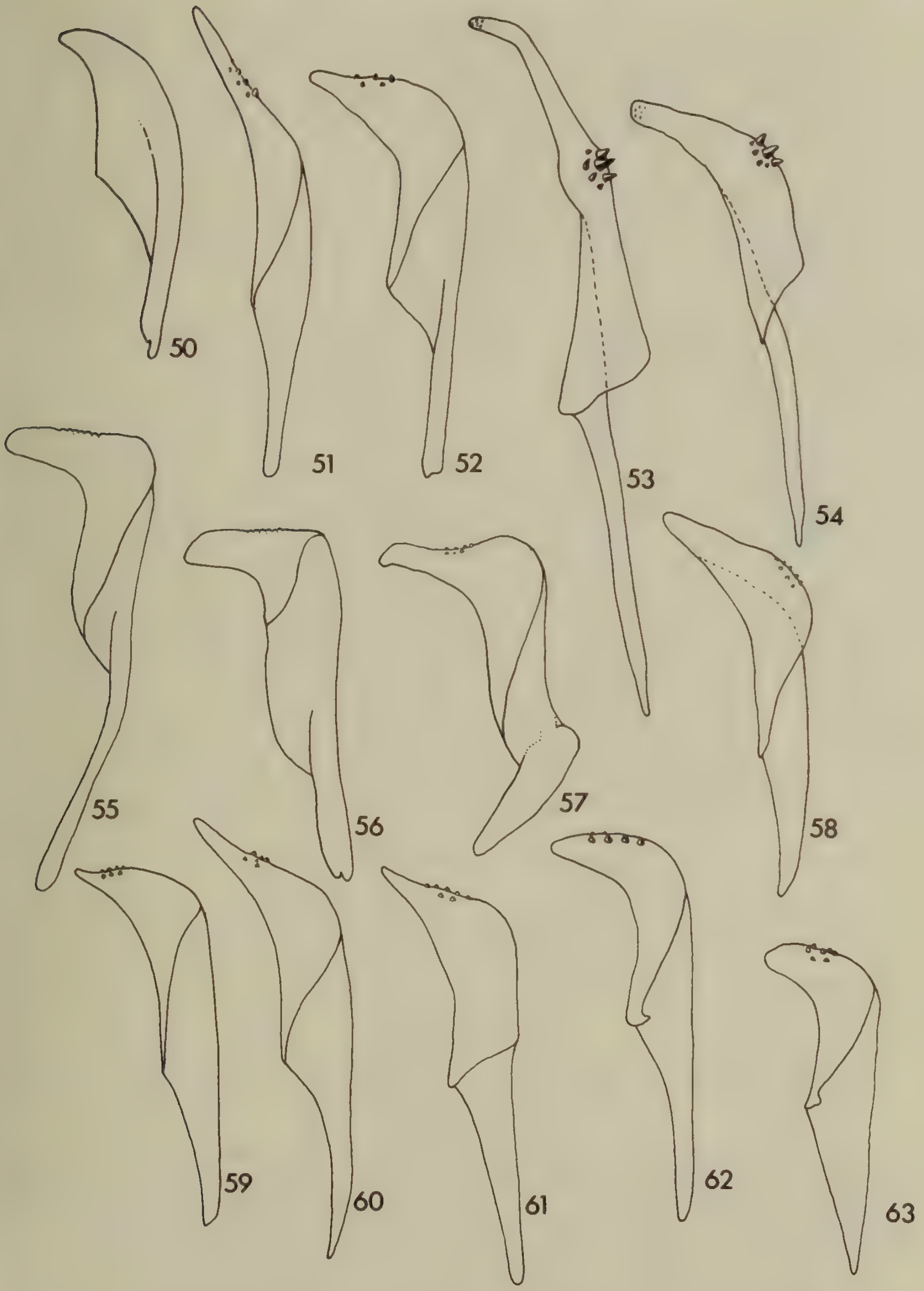
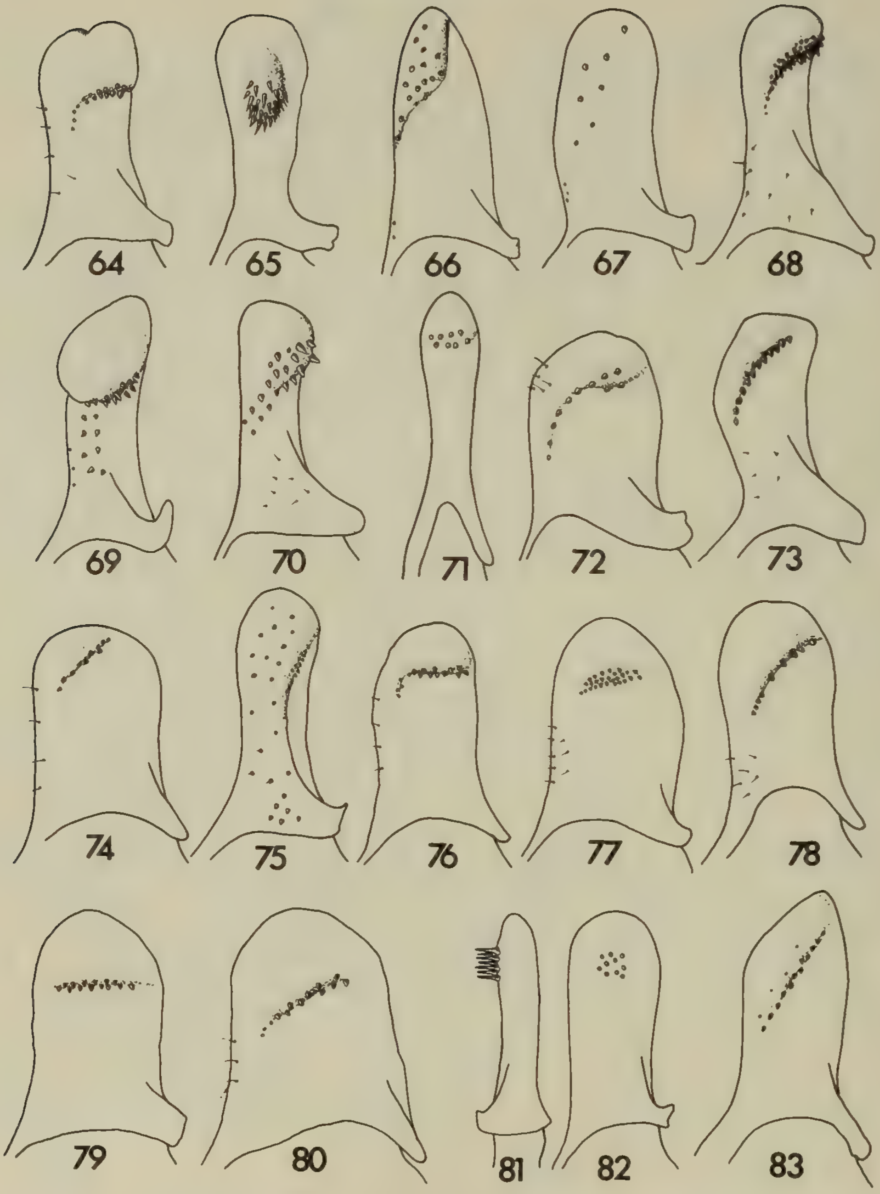
Figs 34–37. Claspers. 34, *Atrometus insignis* Foerster, lateral view; 35, *Metopius dentatus* (F.), lateral view; 36, the same, dorsal view; 37, *Ophion obscuratus* (F.), lateral view. (Labelling as for Text-fig. 30.)

Figs 38–42. Ninth abdominal sternites. 38, *Therion circumflexum* (L.); 39, *Aphanistes xanthopus* (Schrank); 40, *Pseudanomalon gracile* Szépligeti; 41, *Trichomma fulvidens* Wesmael; 42, *Ophiopterus* sp.

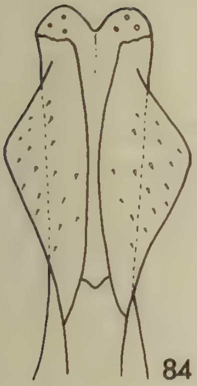
Figs 43–49. Proximal end of paramere. 43, *Clatha longipes* Cameron; 44, *Aphanistes ruficorne* (Gravenhorst); 45, *Parania tricolor* (Szépligeti); 46, *Spolas flavifrons* (Ashmead); 47, *Anomalon foliator* (F.); 48, *Vernamalon spilopterum* (Morley); 49, *Philodrymus vitticollis* (Cresson).

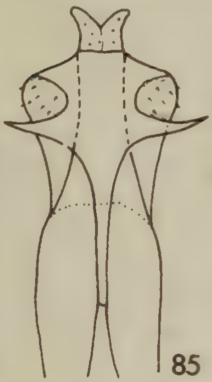


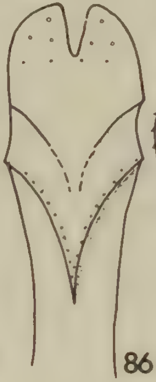
FIGS 50–63. Gonolaciniae (left). 50, *Anomalon foliator* (F.); 51, *Habronyx* (*Habrocampulum*) *biguttatus* (Gravenhorst); 52, *Heteropelma calcator* Wesmael; 53, *Clatha longipes* Cameron; 54, *Parania tricolor* (Szépligeti); 55, *Tanypelma datanae* (Riley); 56, *Trichomma fulvidens* Wesmael; 57, *Therion circumflexum* (L.); 58, *Spolas flavifrons* (Ashmead); 59, *Clypeocampulum tibiale* sp.n.; 60, *Habronyx* (*Camposcopus*) *nigricornis* (Wesmael); 61, *Philodrymus vitticollis* (Cresson); 62, *Vernamalon spilopterum* (Morley); 63, *Cechenodes oweni* Townes.

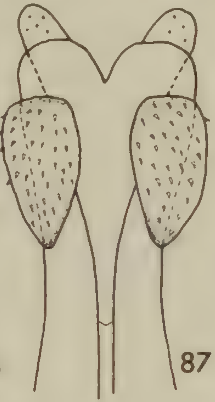


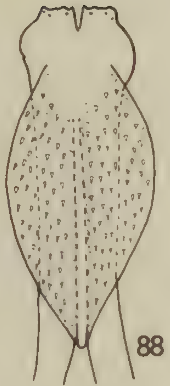
Figs 64–83. Distivolsellae (left), clasping face. 64, *Barylypa carinata* (Brischke); 65, *Trichomma fulvidens* Wesmael; 66, *Vernamalon spilopterum* (Morley); 67, *Anomalon foliator* (F.); 68, *Habronyx* (*Habronyx*) *heros* (Wesmael); 69, *Therion circumflexum* (L.); 70, *Heteropelma calcator* Wesmael; 71, *Clatha longipes* Cameron; 72, *Habronyx* (*Habrocampulum*) *biguttatus* (Gravenhorst); 73, *Aphanistes xanthopus* (Schrank); 74, *Parania tricolor* (Szépligeti); 75, *Tanypelma datanae* (Riley); 76, *Perisphincter tisiphone* (Morley); 77, *Pseudanomalon gracile* Szépligeti; 78, *Podogaster* sp.; 79, *Corsoncus* sp.; 80, *Gravenhorstia* (*Erigorgus*) *cerinops* (Gravenhorst); 81, *Spolas flavifrons* (Ashmead), dorsal aspect; 82, the same, lateral aspect; 83, *Clypeocampulum tibiale* sp. n.

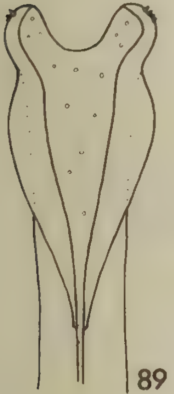


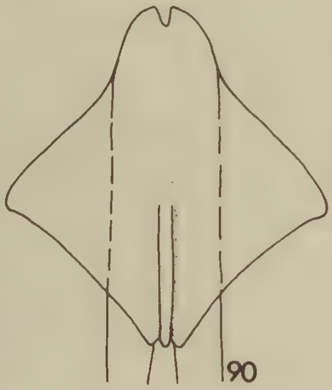


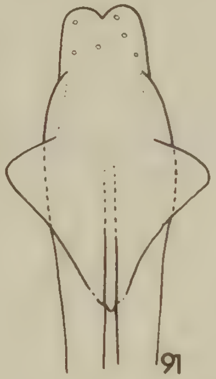


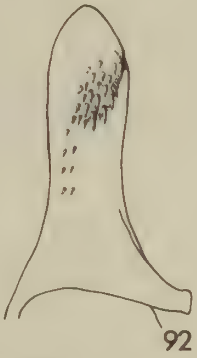


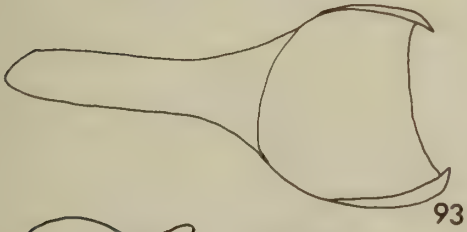


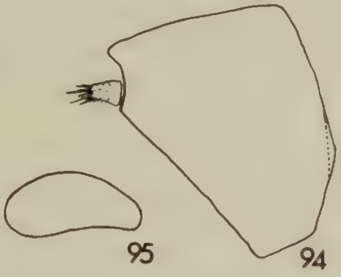


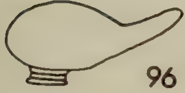


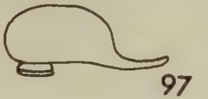


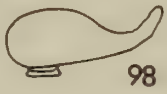


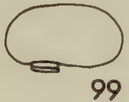










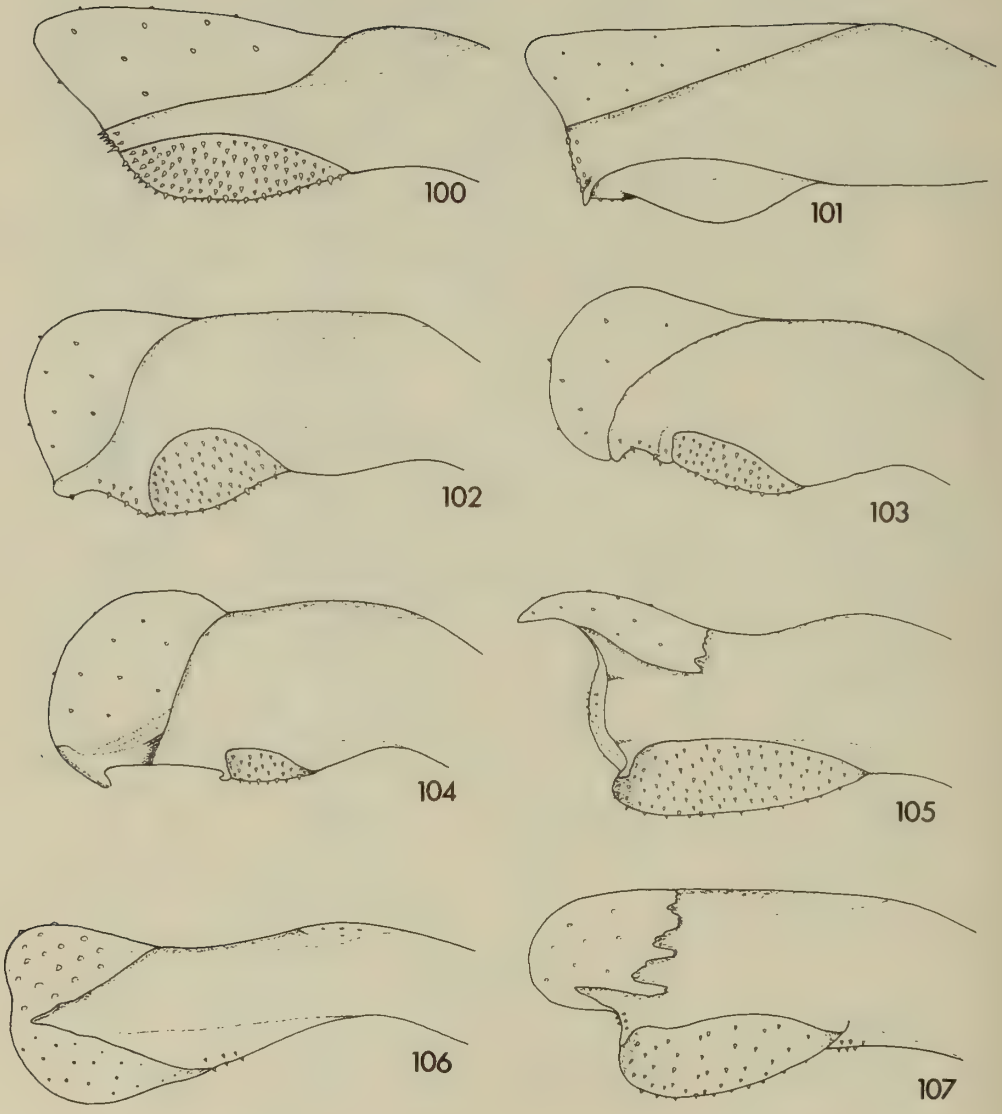


FIGS 84–91. Aedeagal apices, ventral view. 84, *Habronyx* (*Austranomalon*) *pammi* sp. n.; 85, *Corsoncus* sp.; 86, *Anomalon foliator* (F.); 87, *Habronyx* (*Habronyx*) *australasiae* (Morley); 88, *Barylypa carinata* Brischke; 89, *Philodrymus vitticollis* (Cresson); 90, *Agrypon flaveolatum* (Gravenhorst); 91, *Clypeocampulum tibiale* sp. n.

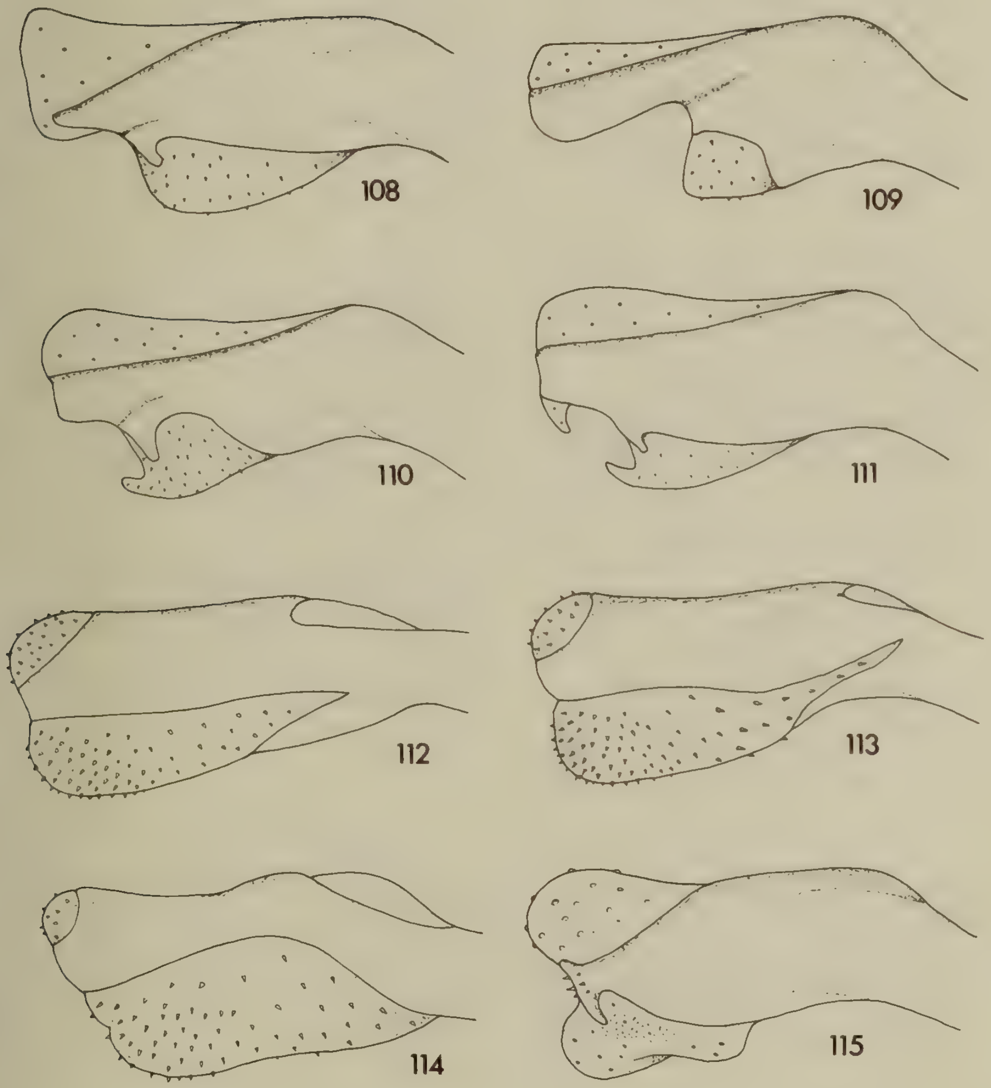
FIG. 92. Distivolsella, clasping face. *Trichomma elegantulum* Turner.

FIGS 93, 94. *Ophionellus fragilis* Westwood, ♂. 93, gonosquama, lateral view; 94, syntergum, lateral view.

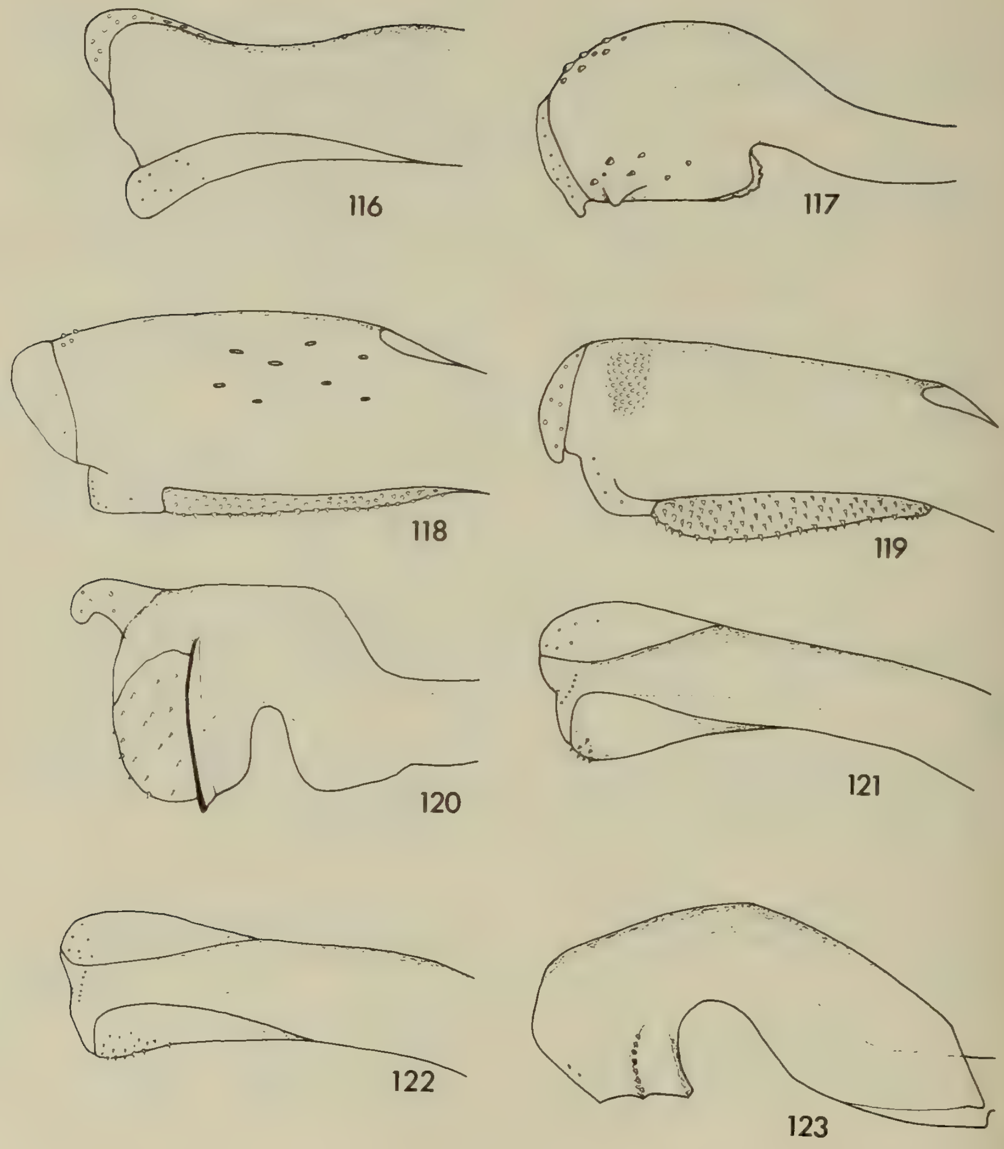
FIGS 95–99. Ovarian eggs. 95, *Gravenhorstia* (*Erigorgus*) *cerinops* (Gravenhorst); 96, *Therion circumflexum* (L.); 97, *Heteropelma calcator* Wesmael; 98, *Trichomma fulvidens* Wesmael; 99, *Aphanistes xanthopus* (Schrank).



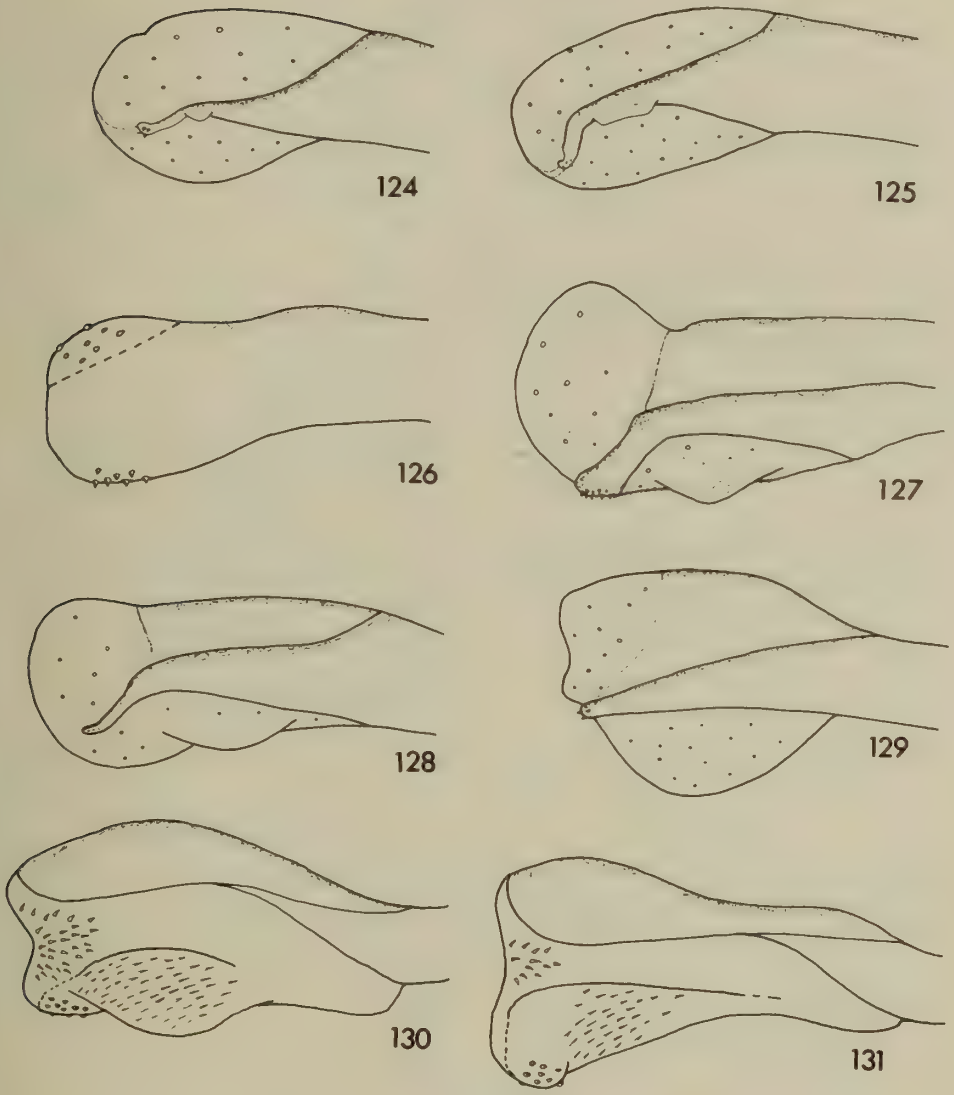
FIGS 100–107. Apices of aedeagi, lateral view. 100, *Habronyx* (*Habronyx*) *heros* (Wesmael); 101, *H.* (*Camposcopus*) *nigricornis* (Wesmael); 102, *H.* (*Habronyx*) *orbitale* (Morley); 103, *H.* (*H.*) *insidiator* (Smith); 104, *H.* (*H.*) *pyretorus* (Cameron); 105, *H.* (*H.*) *australasiae* (Morley); 106, *H.* (*Habrocampulum*) *biguttatus* (Gravenhorst); 107, *H.* (*Austranomalon*) *pammi* sp. n.



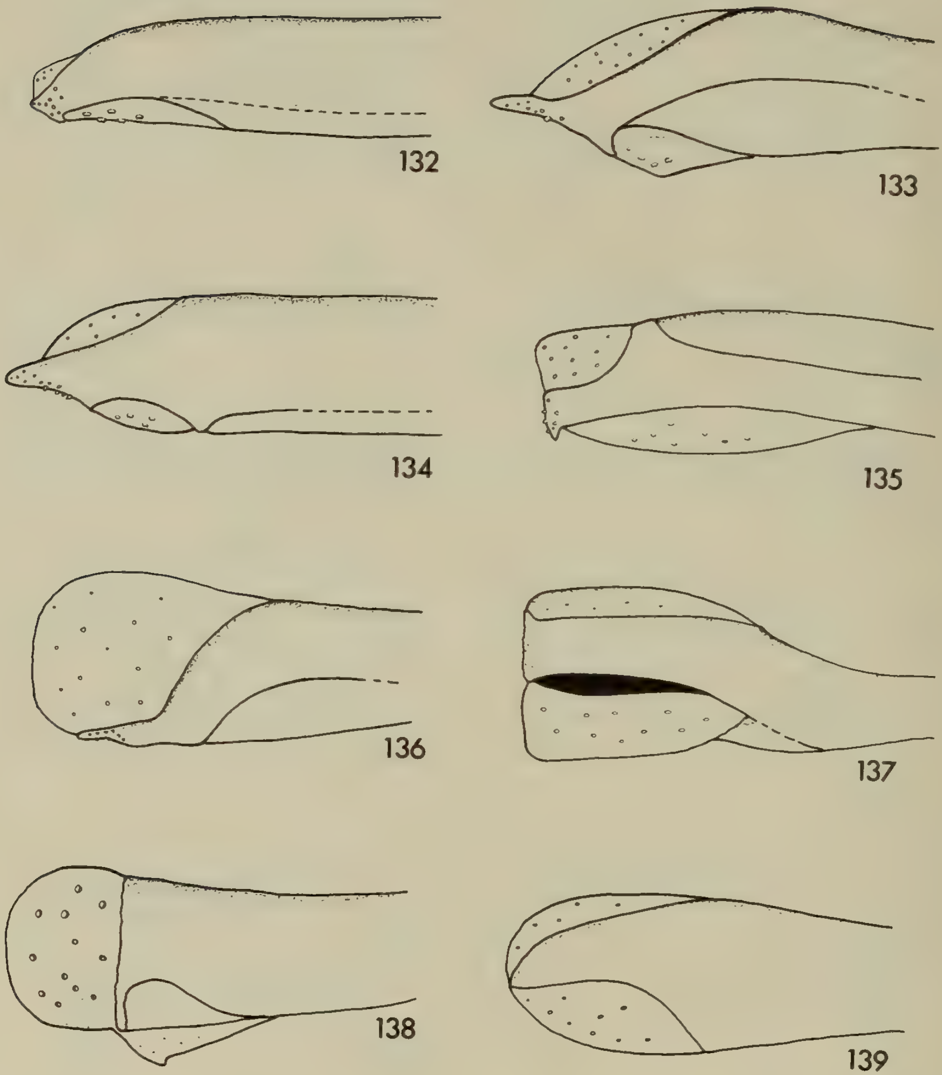
Figs 108–115. Apices of aedeagi, lateral view. 108, *Gravenhorstia* (*Erigorgus*) *cerinops* (Gravenhorst); 109, *G.* (*E.*) *nigrita* (Norton); 110, *G.* (*Kokujewiella*) *ibera* (Ceballos); 111, *G.* (*Gravenhorstia*) *picta* Boie; 112, *Aphanistes xanthopus* (Schrank); 113, *A. ruficornis* (Gravenhorst); 114, *A. variicolor* (Morley); 115, *Clypeocampulum tibiale* sp. n.



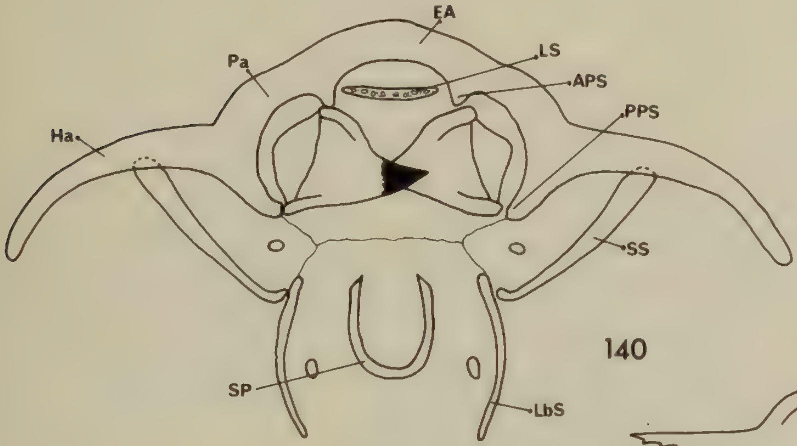
Figs 116–123. Apices of aedeagi, lateral view. 116, *Encardia picta* Tosquinet; 117, *Pseudanomalon gracile* Szépligeti; 118, *Barylypa carinata* Brischke; 119, *B. delictor* (Thunberg); 120, *Corsoncus* sp.; 121, *Tanypelma datanae* (Riley); 122, *Heteropelma calcator* Wesmael; 123, *Therion circumflexum* (L.).



FIGS 124–131. Apices of aedeagi, lateral view. 124, *Podogaster coarctata* Brullé; 125, *Philodrymus vitticollis* (Cresson); 126, *Ophionellus fragilis* Westwood; 127, *Perisphincter* sp.; 128, *Phaenolabrorychus anisiti* Viereck; 129, *Agrypon flaveolatum* (Gravenhorst); 130, *Trichomma fulvidens* Wesmael; 131, *T. elegantulum* Turner.



Figs 132–139. Apices of aedeagi, lateral view. 132, *Parania tricolor* (Szépligeti); 133, *Spolas flavifrons* (Ashmead); 134, *Clatha longipes* Cameron; 135, *Atrometus insignis* Foerster; 136, *Vernamalon spilopterum* (Morley); 137, *Cechenodes oweni* Townes; 138, *Ophiopterus* sp.; 139, *Metoa exilis* (Provancher).



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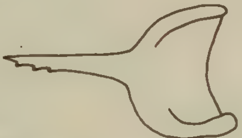

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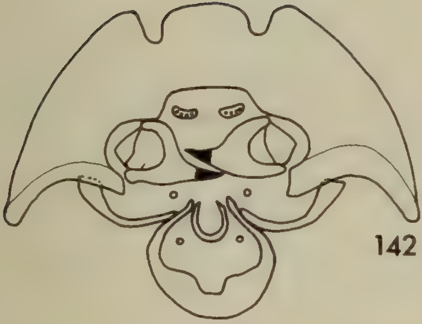

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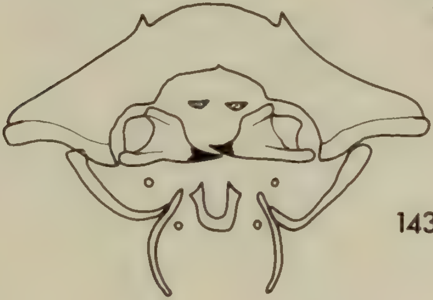

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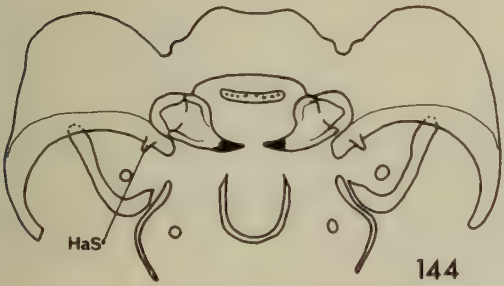

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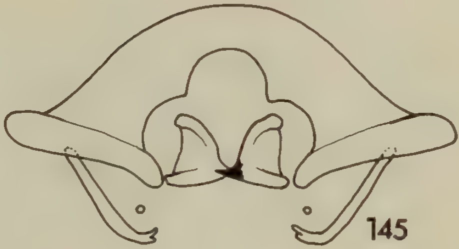

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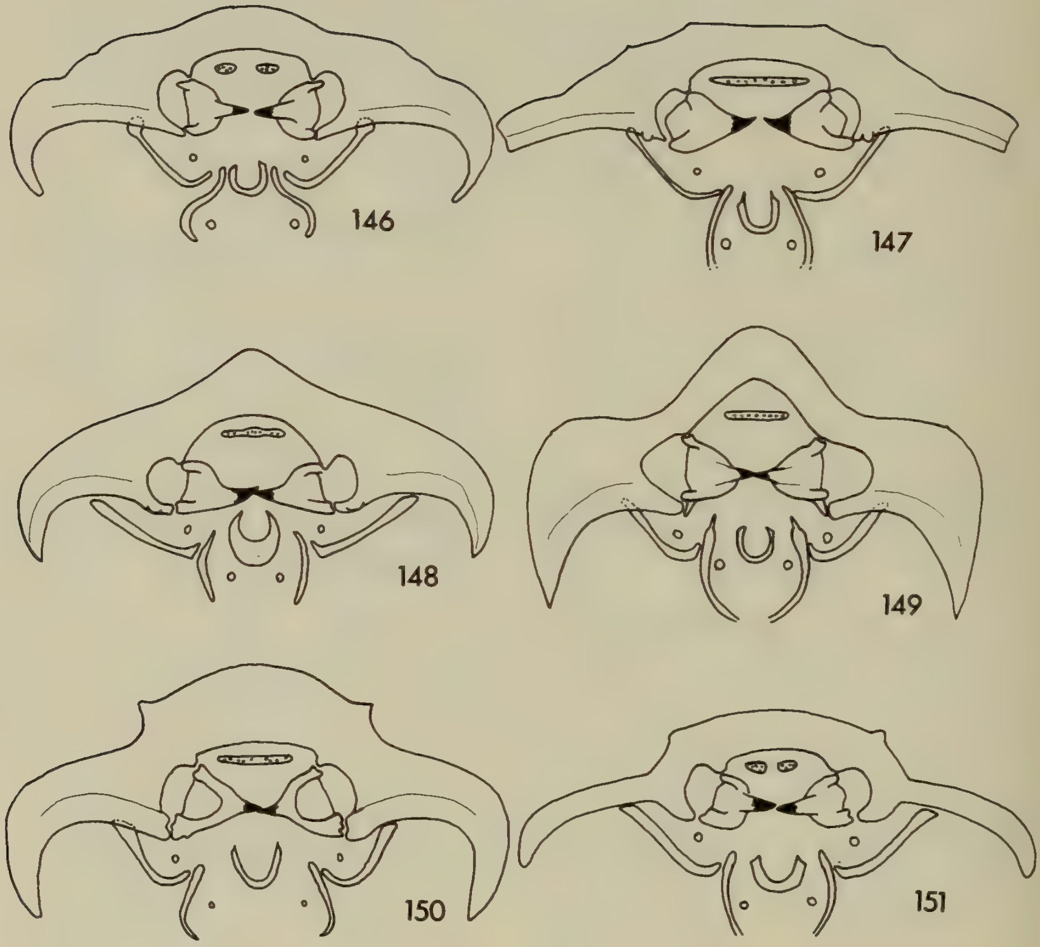
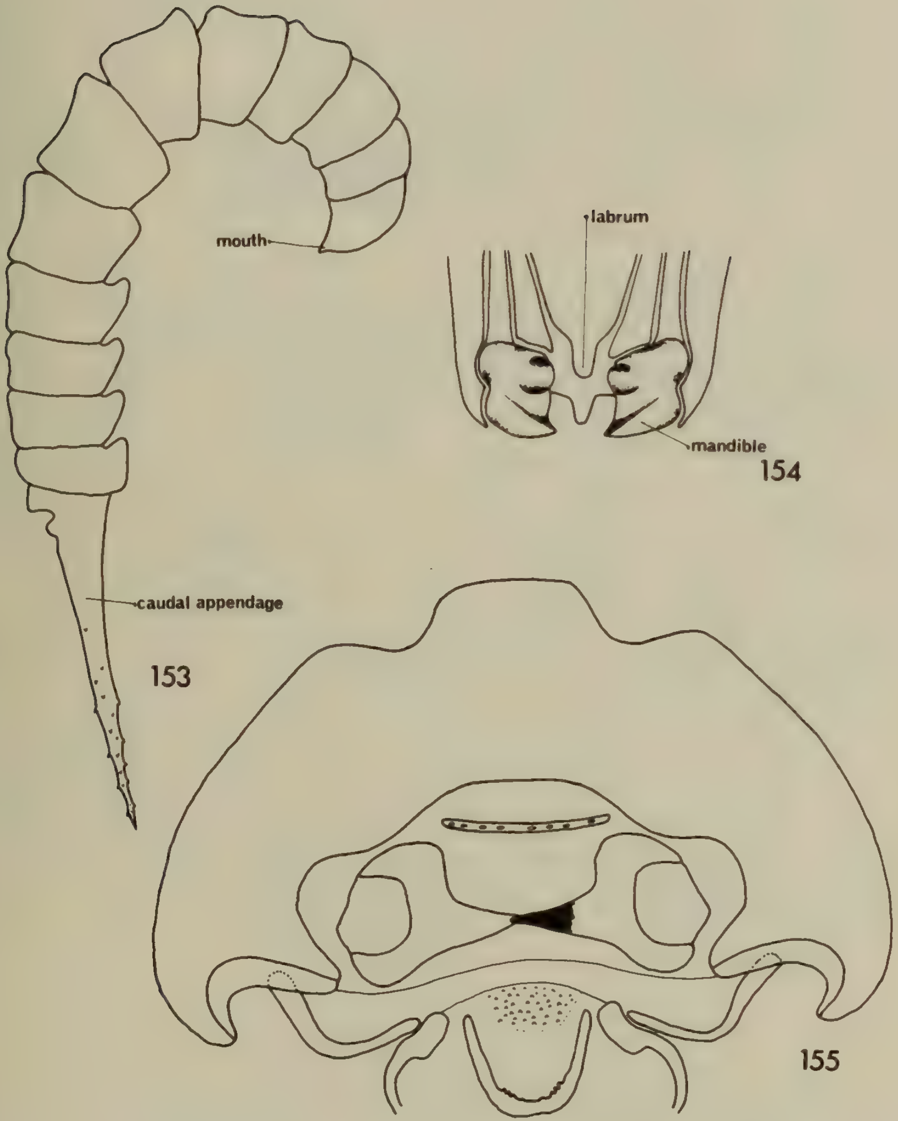
FIG. 140. Cephalic capsule of final instar larva of *Habronyx* (*Camposcopus*) *nigricornis* Wesmael.

FIG. 141. Mandible of final instar larva of *Anomalon* sp.

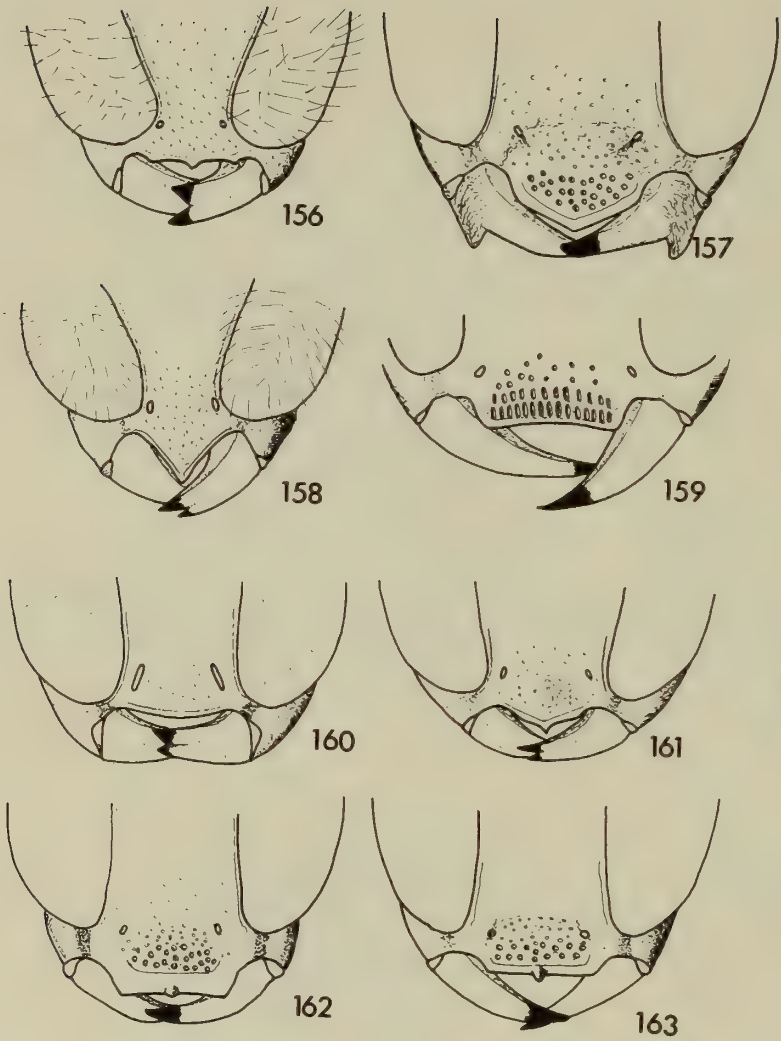
FIGS 142–145. Cephalic capsules of final instar larvae. 142, *Heteropelma capitatum* (Desvignes); 143, *Therion brevicorne* (Gravenhorst); 144, *Habronyx* (*Habronyx*) *pyretorus*? (Cameron); 145, *Trichomma enecator* (Rossi). Abbreviations used in figures: APS anterior pleurostomal process; EA epistomal arch; Ha hypostoma; HaS hypostomal spur; LbS labial sclerite; LS labral sensillae; Pa pleurostoma; PPS posterior pleurostomal process; SP silk press; SS stipital sclerite.

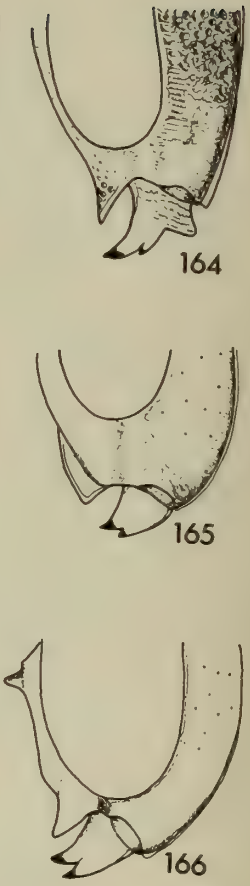


Figs 146–151. Cephalic capsules of final instar larvae. 146, *Perisphincter* sp.; 147, *Gravenhorstia* (*Erigorgus*) *melanops* (Foerster); 148, *Habronyx* (*Austranomalon*) *pammi* sp. n.; 149, *Parania tricolor* (Szépligeti); 150, *Aphanistes bellicosus* (Wesmael); 151, *Agrypon anxium* (Wesmael).


mouth
caudal appendage
153
labrum
mandible
154
155

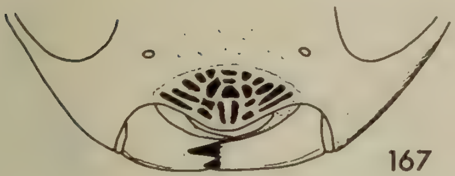
FIGS 153–155. *Encardia picta* Tosquinet. 153, first instar larva, entire; 154, first instar larva, mouth, dorsal view; 155, cephalic capsule of final instar larva.





Figs 156–163. Lower faces, anterior view. 156, *Trichomma* sp. (South American); 157, *Gravenhorstia* (*Ribasia*) *erythrogaster* (Ceballos); 158, *Trichomma enecator* (Rossi); 159, *Aubertiana unidentator* (Aubert); 160, *Habronyx* (*Austranomalon*) *pammi* sp. n.; 161, *Gravenhorstia* (*Erigorgus*) *latro* (Schrank); 162, *G.* (*E.*) *nigrita* (Norton); 163, *G.* (*E.*) *buccata* (Morley).

Figs 164–166. Heads, lateral view. 164, *Gravenhorstia* (*Ribasia*) *erythrogaster* (Ceballos); 165, *Habronyx* (*Habronyx*) *australasiae* (Morley); 166, *Gravenhorstia* (*Gravenhorstia*) *picta* Boie.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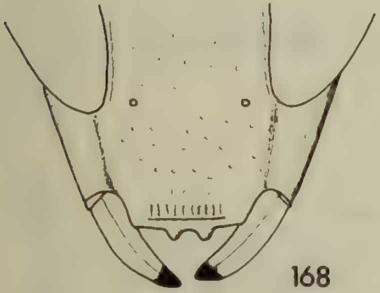
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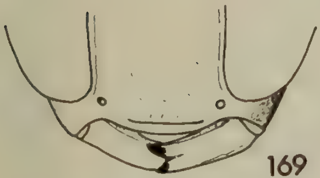
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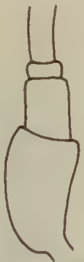
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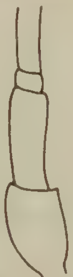
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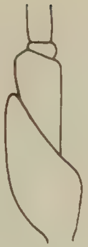
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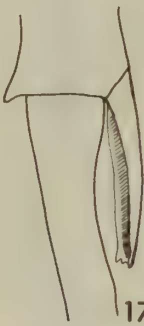
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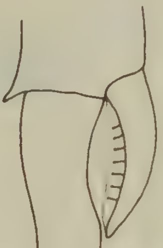
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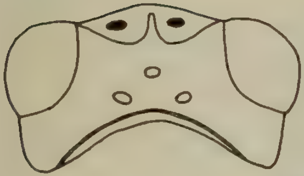
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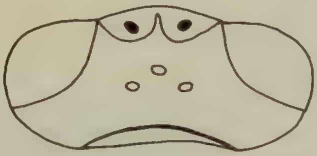
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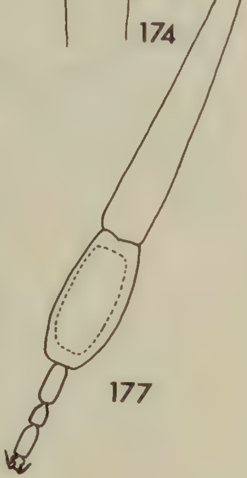
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Figs 167–169. Lower faces, anterior view. 167, *Clypeocampulum tibiale* sp. n.; 168, *Anomalon rufipes* (Cameron); 169, *A. foliator* (F.).

Figs 170–172. Basal antennal segments. 170, *Trichomma fulvidens* Wesmael; 171, *Phaenolabrorychus anisitsi* Viereck; 172, *Ophiopterus* sp.

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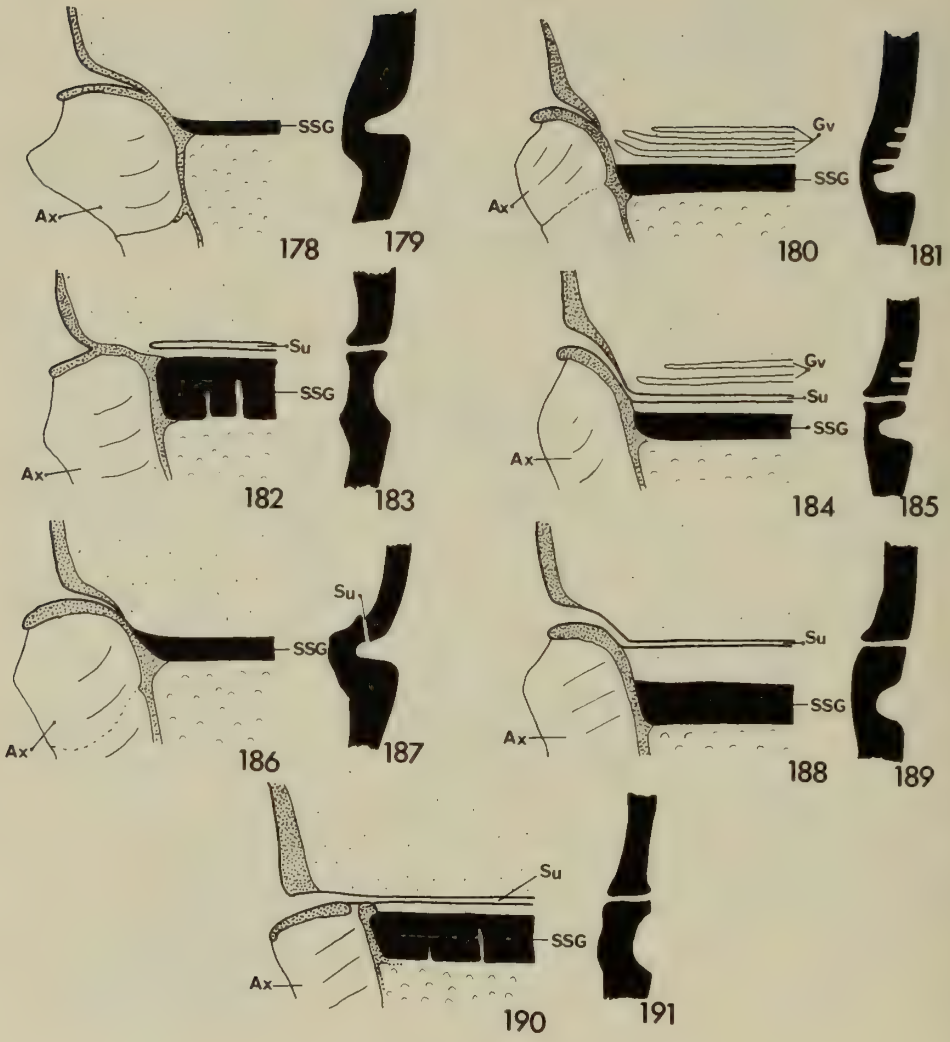
Figs 175, 176. Heads, dorsal view. 175, *Heteropelma scaposum* (Morley); 176, *H. perornatum* (Cameron).

Fig. 177. Hind tarsi, ventral view. *Heteropelma capitatum* (Desvignes).


SSG
Ax
178
179
Gv
SSG
Ax
180
181
Su
SSG
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183
Gv
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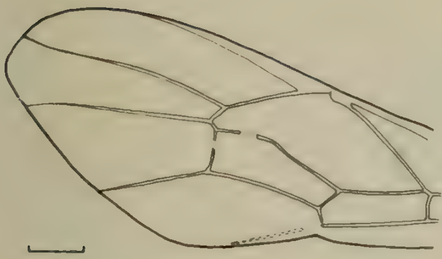
Ax
184
185
Su
SSG
Ax
186
187
Su
SSG
Ax
188
189
Su
SSG
Ax
190
191

FIGS 178–191. Scuto-scutellar regions. 178, *Agrypon anxium* (Wesmael); 179, the same, median longitudinal section; 180, *Phaenolabrorychus anisitsi* Viereck; 181, the same, median longitudinal section; 182, *Agrypon albiditarsus* Morley; 183, the same, median longitudinal section; 184, *Ophiopterus coarctatus* Brullé; 185, the same, median longitudinal section; 186, *Vernamalon spilopterum* (Morley); 187, the same, median longitudinal section; 188, *Ophionellus fragilis* Westwood; 189, the same, median longitudinal section; 190, *Philodrymus vitticollis* (Cresson); 191, the same, median longitudinal section. Abbreviations used in figures: Ax axilla; Gv groove; SSG scuto-scutellar groove; Su suture. Coarse stippling denotes carinae, fine stippling the mesoscutum and inverted-U shading the scutellum.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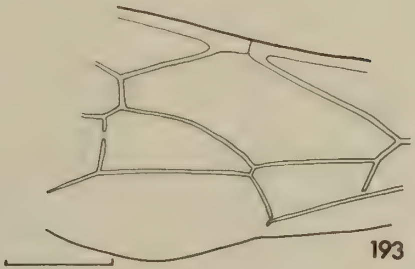
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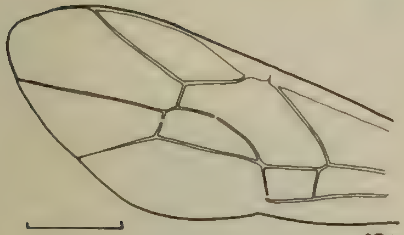
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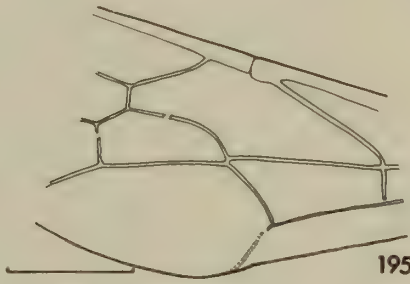
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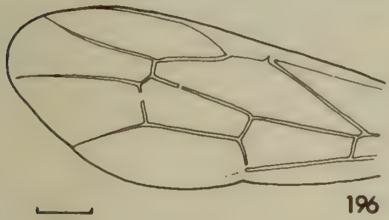
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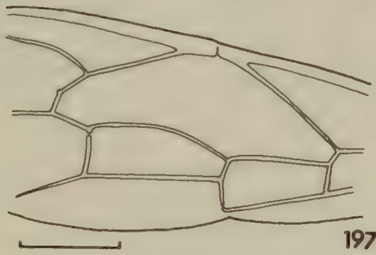
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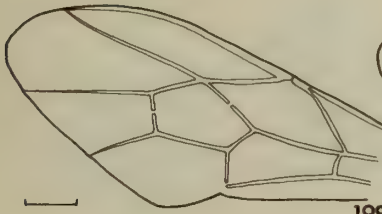
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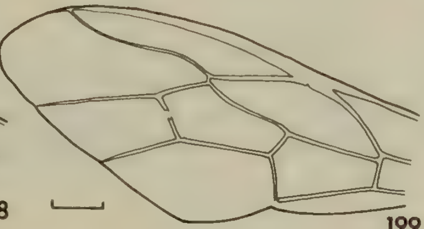
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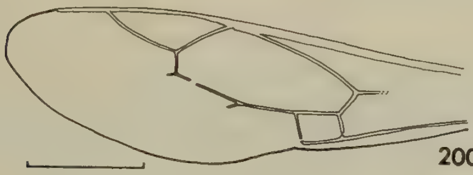
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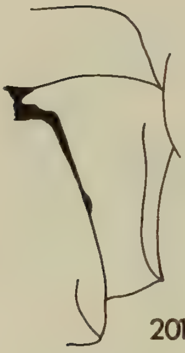

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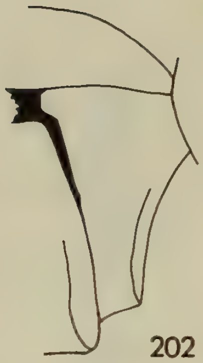

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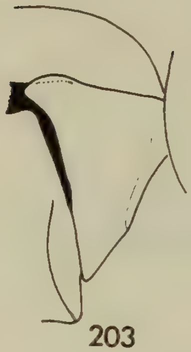

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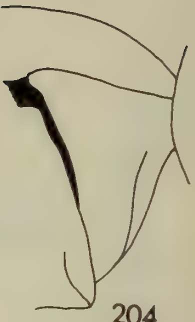

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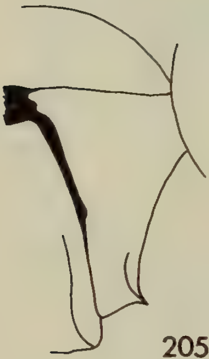

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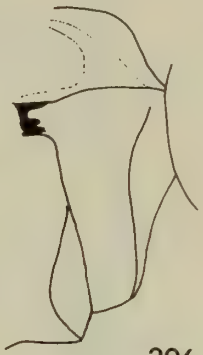

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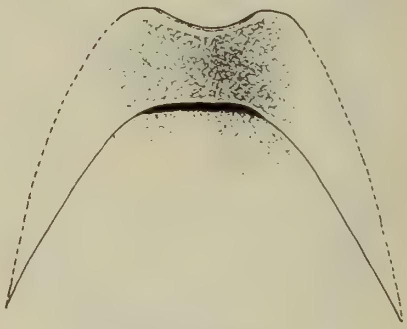

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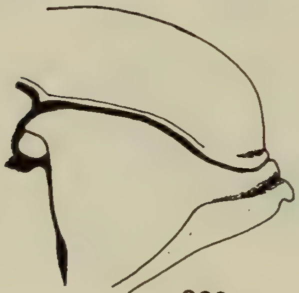

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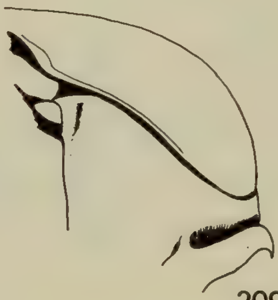

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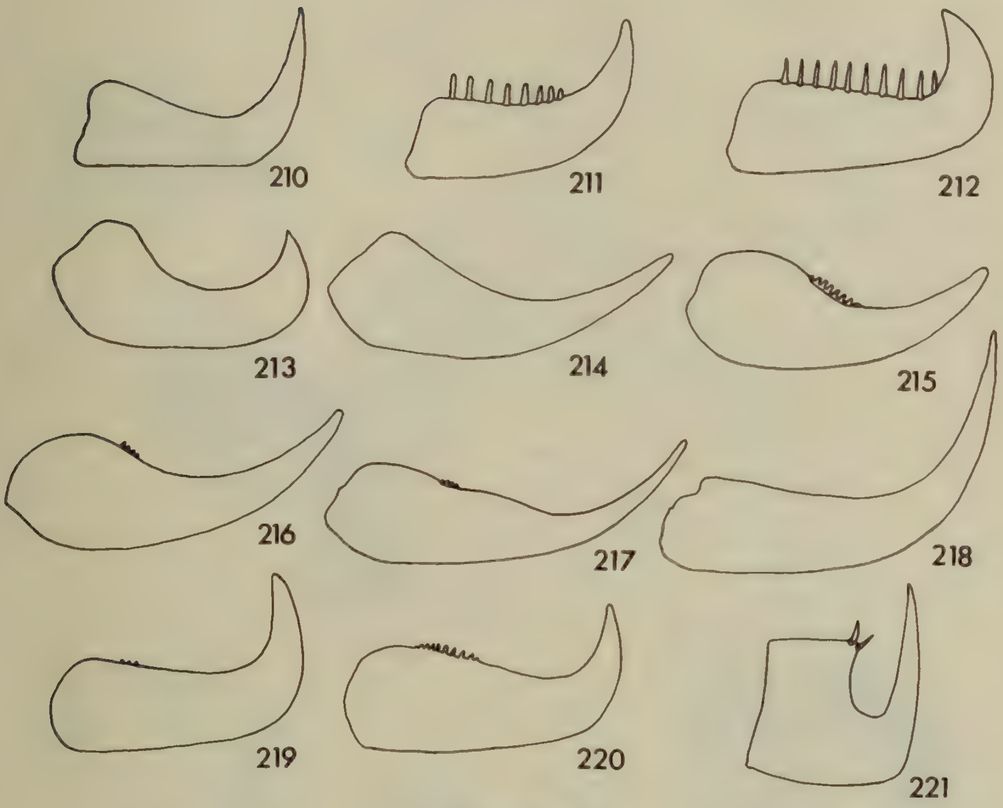
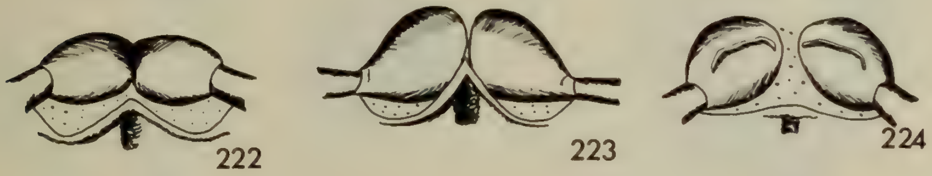
FIGS 201–206. Pronotum and anterior of mesoscutum in profile. 201, *Habronyx* (*Habrocampulum*) *biguttatus* (Gravenhorst); 202, *Therion circumflexum* (L.); 203, *Spolas flavifrons* (Ashmead); 204, *Gravenhorstia* (*Erigorgus*) *latro* (Schrank); 205, *Heteropelma scaposum* (Morley); 206, *Habronyx* (*Camposcopus*) *nigricornis* (Wesmael).

FIG. 207. Pronotum and anterior of mesoscutum, dorsal view. *Barylypa humeralis* Brauns.

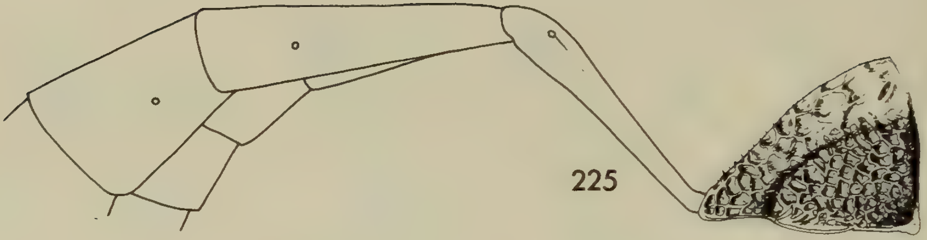
FIGS 208, 209. Pronotum and anterior of mesoscutum, dorso-anterio-lateral aspect. 208, *Aphanistes ruficornis* (Gravenhorst); 209, *Gravenhorstia* (*Gravenhorstia*) *picta* Boie. (Figs 208–209 drawn from electronmicrographs.)

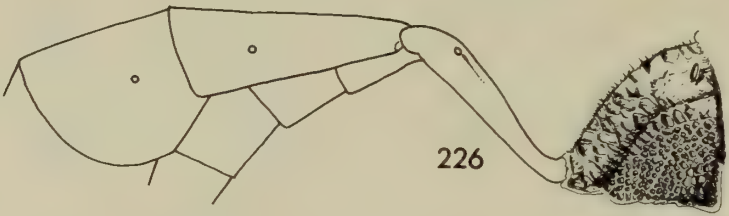


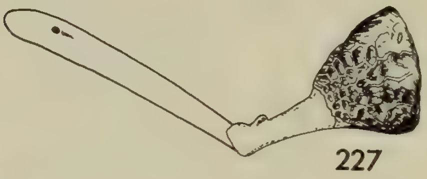


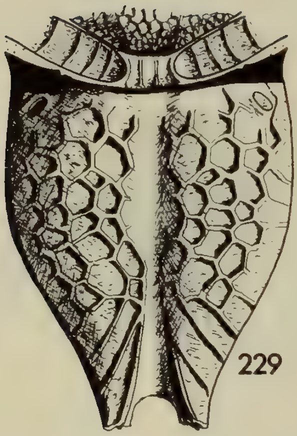
FIGS 210–221. Hind tarsal claws. 210, *Habronyx* (*Habronyx*) *insidiator* (Smith) ♂; 211, *H.* (*H.*) *heros* (Wesmael) ♂; 212, *Aphanistes bellicosus* (Wesmael) ♂; 213, *Habronyx* (*Austranomalon*) *pammi* sp. n. ♀; 214, the same, ♂; 215, *Gravenhorstia* (*Erigorgus*) *latro* (Schrank), ♀; 216, the same, ♂; 217, *G.* (*E.*) *melanobatus* (Gravenhorst) ♀; 218, the same, ♂; 219, *Habronyx* (*Habrocampulum*) *biguttatus* (Gravenhorst) ♀; 220, the same, ♂; 221, *Heteropelma calcator* Wesmael ♀.

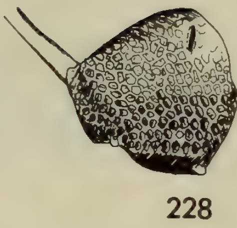
FIGS 222–224. Fore coxae, ventral view. 222, *Atrometus insignis* Foerster; 223, *Podogaster coarctata* Brullé; 224, *Agrypon anxium* (Wesmael).

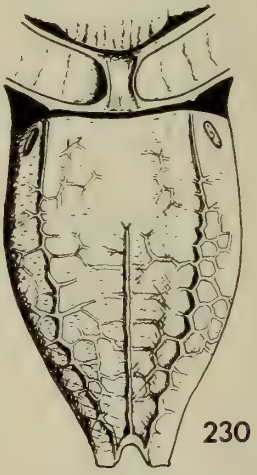






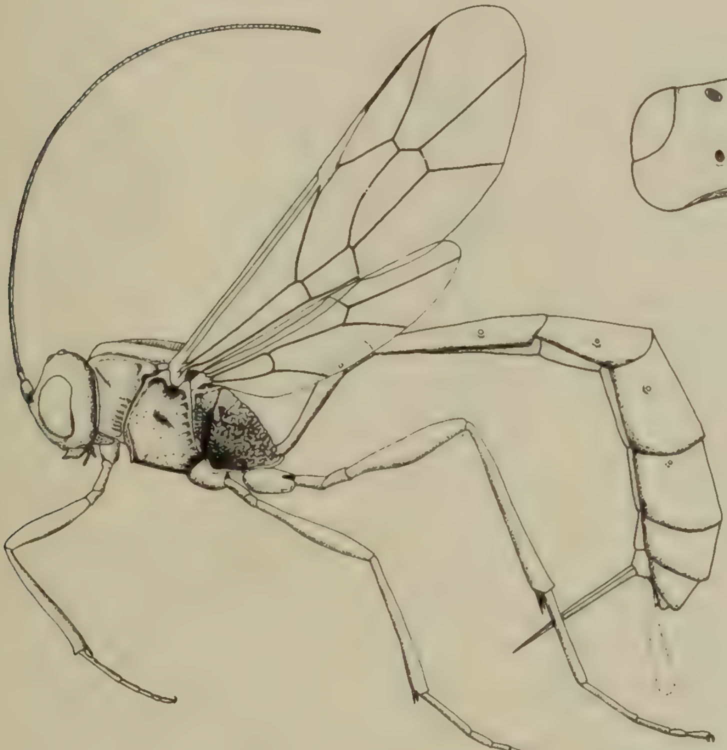






Figs 225–228. Propodeum and basal segments of gaster, lateral view. 225, *Gravenhorstia* (*Erigorgus*) *cerinops* (Gravenhorst); 226, *G.* (*Kokujewiella*) *ibera* (Ceballos); 227, *Cechenodes oweni* Townes; 228, *Brachynervus confusus* sp. n.

Figs 229, 230. Propodeum, dorsal view. 229, *Habronyx* (*Habronyx*) *heros* (Wesmael); 230, *H.* (*Habrocampulum*) *biguttatus* (Gravenhorst).



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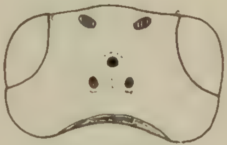

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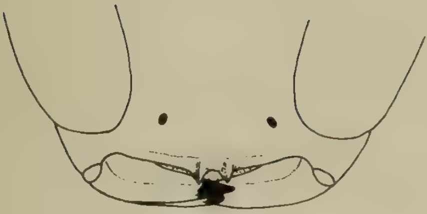

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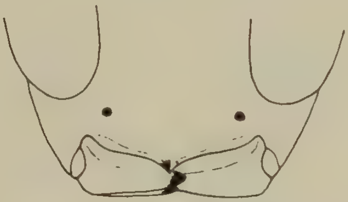

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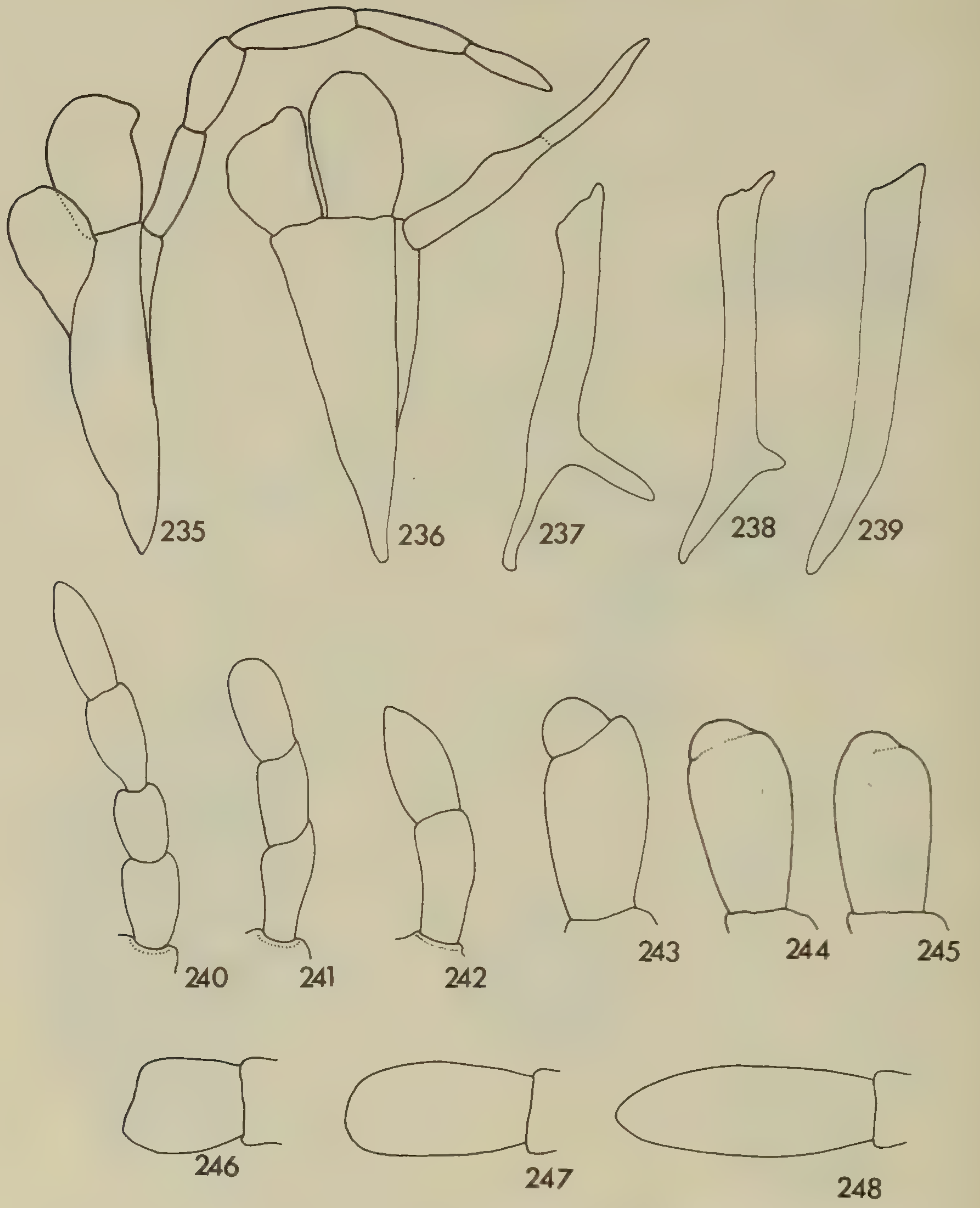
FIGS 231–233. *Vernamalon spilopterum* (Morley). 231, ♀ entire; 232, head, dorsal view; 233, lower face, anterior view.

FIG. 234. *Bimentum* sp., lower face, anterior view.



Figs 235, 236. Right maxillae. 235, *Barylypa carinata* Brischke; 236, *Encardia picta* Tosquinet.

Figs 237–239. Right cardina. 237, *Agrypon flaveolatum* (Gravenhorst); 238, *Gravenhorstia* (*Erigorgus*) *cerinops* (Gravenhorst); 239, *Anomalon foliator* (F.).

Figs 240–242. Labial palps. 240, *Gravenhorstia* (*Erigorgus*) *cerinops* (Gravenhorst); 241, *Trichomma enecator* (Rossi); 242, *Encardia picta* Tosquinet.

Figs 243–245. Distal segments of labial palps of *Agrypon anxium* Wesmael. 243, segments 3 and 4 separate; 244, segment 4 partially fused to segment 3; 245, segment 4 virtually entirely fused to segment 3.

Figs 246–248. Variation in shape of terminal segments of labial palps of *Therion circumflexum* (L.). (Figs 235–248 drawn from slides prepared from females only.)

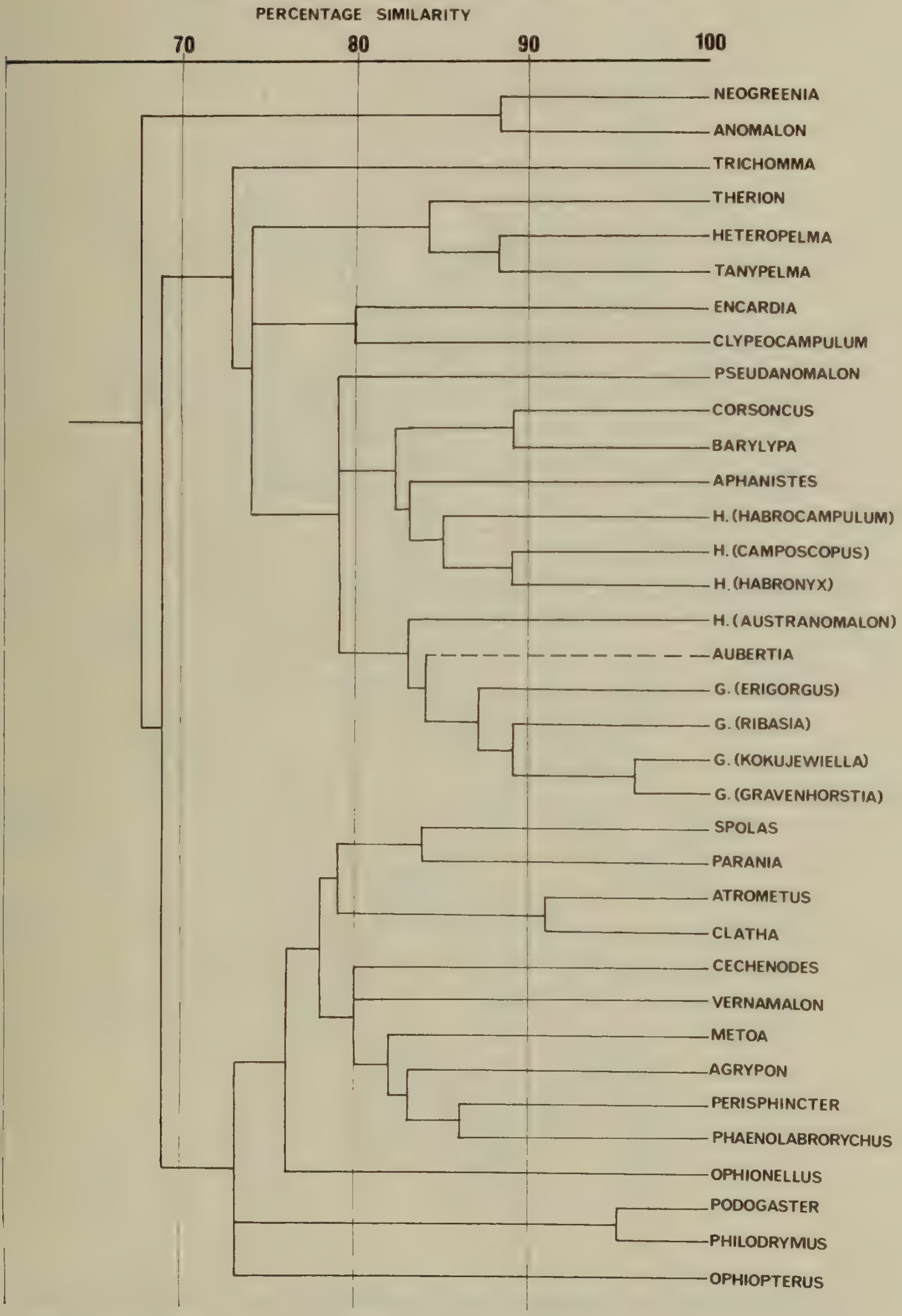

PERCENTAGE SIMILARITY
70
80
90
100
NEOGREENIA
ANOMALON
TRICHOMMA
THERION
HETEROPELMA
TANYPELMA
ENCARDIA
CLYPEOCAMPULUM
PSEUDANOMALON
CORSONCUS
BARYLYPA
APHANISTES
H. (HABROCAMPULUM)
H. (CAMPOSCOPUS)
H. (HABRONYX)
H. (AUSTRANOMALON)
AUBERTIA
G. (ERIGORGUS)
G. (RIBASIA)
G. (KOKUJEWIELLA)
G. (GRAVENHORSTIA)
SPOLAS
PARANIA
ATROMETUS
CLATHA
CECHENODES
VERNAMALON
METOA
AGRYPON
PERISPHINCTER
PHAENOLABRORYCHUS
OPHIONELLUS
PODOGASTER
PHILODRYMUS
OPHIOPTERUS

FIG. 249. Dendrogram showing the phenetic interrelationships between genera as represented by the type-species of the several genera.

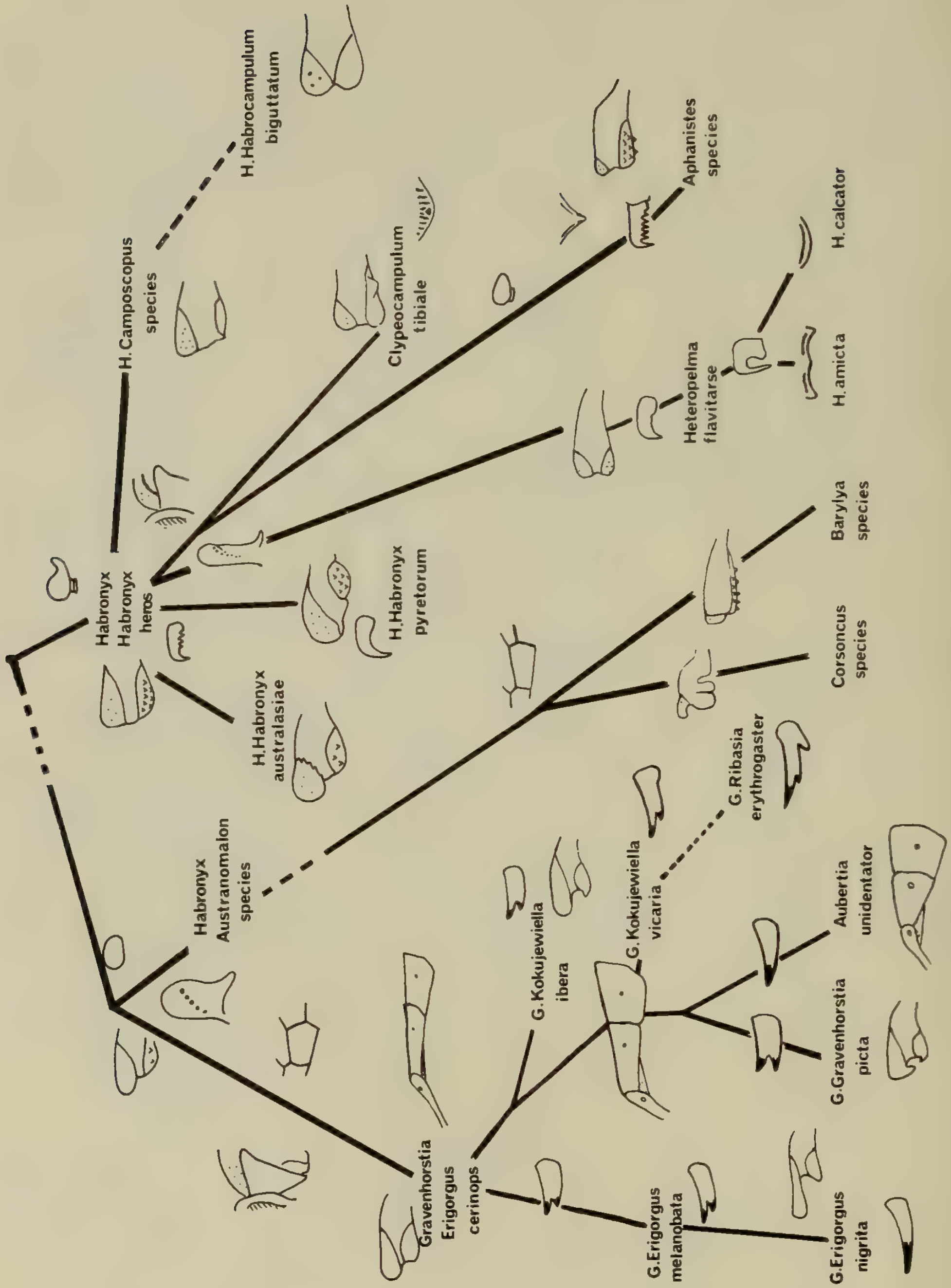
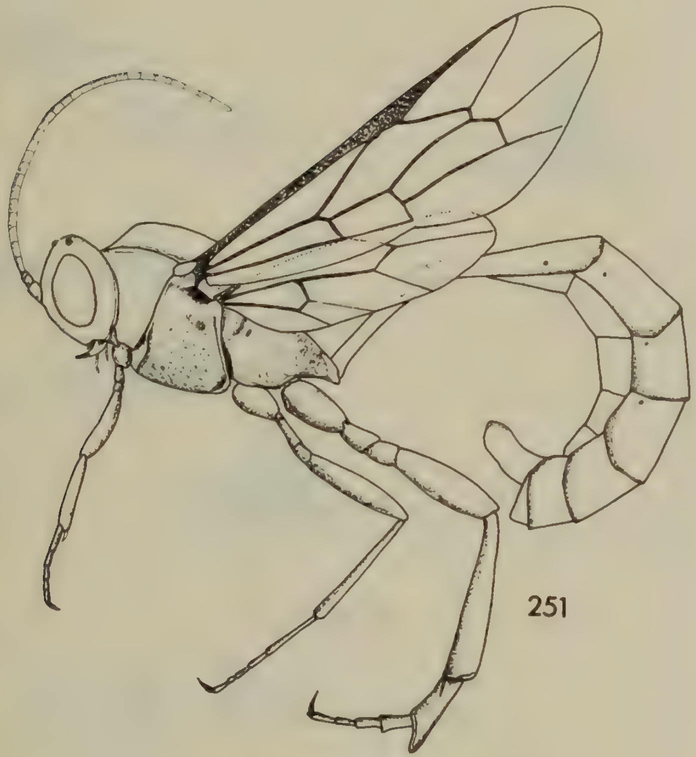

H. Habrocampulum biguttatum
H. Camposcopus species
Clypeocampulum tibiale
Aphanistes species
H. calcator
Heteropelma flavitarse
H. amicta
Barylya species
Habronyx Habronyx heros
H. Habronyx pyretorum
Corsoncus species
H. Habronyx australasiae
G. Ribasia erythrogaster
Habronyx Austranomalon species
G. Kokujewiella vicaria
G. Kokujewiella ibera
Aubertia unidentator
G. Gravenhorstia picta
Gravenhorstia Erigorgus cerinops
G. Erigorgus melanobata
G. Erigorgus nigrita

FIG. 250. Phylogenic interrelationships between the more primitive Therionine genera. Illustrations show the modifications that are thought to have occurred in the various evolutionary pathways. (For full discussion see text.)



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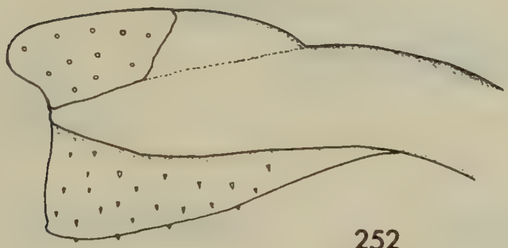

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FIGS 251, 252. *Porizonopteron metatarsator* Shaumar. 251, ♂ entire, lateral view; 252, aedeagus, lateral view.

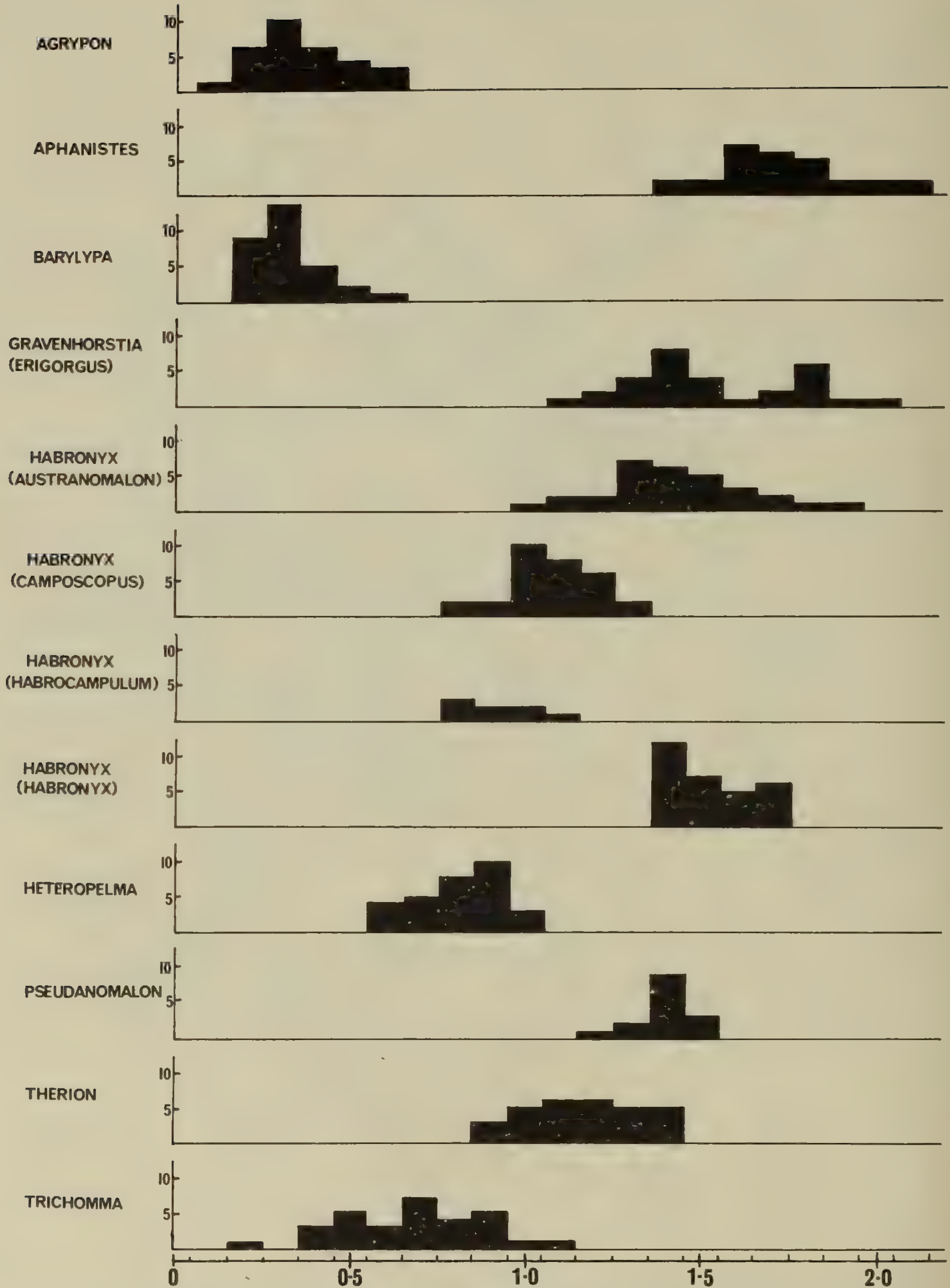

CHART 1. Comparison of the ranges of variation of the cubital index, CI, of the larger Therionine genera. x axis indicates values of CI; class width = 0·10: y axis indicates the number of individuals per class in each genus (n per genus = 30, except for *Habronyx* (*Habrocampulum*) $n = 8$ and *Pseudanomalon* $n = 15$).

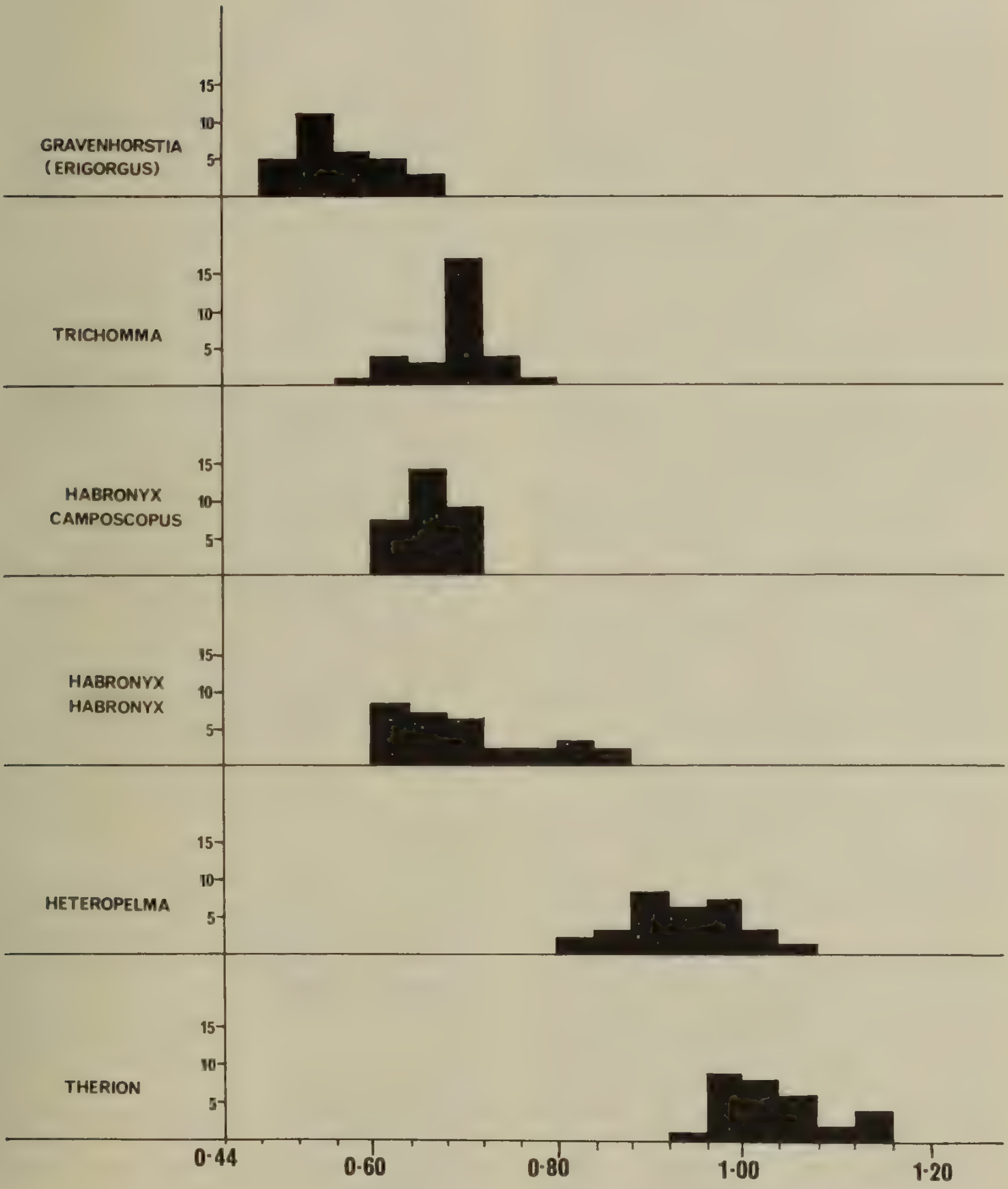

CHART 2. Comparison of the ranges of variation of the discobrachial index, DBI, of some Therionine genera. x axis indicates values of DBI; class width = 0·04: y axis indicates the number of individuals per class in each genus (n per genus = 30).

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P. M. HAMMOND

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BY

PETER MICHAEL HAMMOND

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By P. M. HAMMOND

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SYNOPSIS

The genus *Anotylus* C. G. Thomson, containing 350 species here regarded as valid, is redefined. Morphological variation within the genus is briefly reviewed. A summary of available data concerning zoogeography, biology, immature stages and fossil species is provided. Subcosmopolitan and adventive species are individually but briefly discussed. Sixty-five specific names are newly assigned to *Anotylus*, fourteen of them in synonymy. Seven new generic synonymies and thirty new specific synonymies are noted.

INTRODUCTION

The present account stems from studies of the taxonomy and phylogeny of the Oxytelini on a world basis. The introductory sections of this paper are longer and more discursive than is usual for a taxonomic account of limited scope, for the following reasons. Firstly, I consider it useful for a taxonomist to provide some indication of the possible value of his chosen studies and, in the case of taxonomic work on Coleoptera at the species-level, important to justify his choice, with due regard to the time and effort involved. Secondly, users are better able to evaluate a taxonomic work if its procedural and philosophical basis has been stated. In particular, I feel that the user is entitled to fairly explicit information concerning the *nature* of a classification which is newly proposed, and concerning aspects of procedure which greatly influence the precision of results. Thirdly, as far as aims, procedure and philosophical basis are concerned, parts of the present work may be regarded as a common introduction to projected accounts of other oxyteline genera as well as to further papers on the genus *Anotylus* (e.g. Hammond, in press).

At least some work at the species-level is essential if the systematist is not to deprive himself of a wide range of useful experience. The Oxytelini commend themselves, at the present time, to this type of study for a variety of reasons. Favourable personal circumstances include ready availability of much of the relevant type-material. The generic and supra-generic classification of the subfamily Oxytelinae has recently been competently revised (Herman, 1970). Improvements to this classification are most likely to stem from comprehensive studies of species. However, in both taxonomic and other respects, the great majority of species are, at present, poorly known. More than 50% of Oxytelini have received no published mention, apart from catalogue listings, since their original description. Probably less than 10% of described species can be satisfactorily identified be means of existing keys and diagnoses. Large numbers of species await description. The Oxytelini are a large and successful group, frequently well represented in collections made for systematic or applied purposes. In certain situations species of Oxytelini may form a considerable part of the insect biomass. This is particularly reflected in samples of insects taken in flight or attracted to light-traps. Any poorly known but successful group of organisms whose members are frequently common in samples taken for ecological purposes may be considered to merit the attention of taxonomists. If, as seems likely, but unlike most Staphylinidae, species of Oxytelini feed largely on dead plant material, then it may be useful to know more of their ecology and therefore of their taxonomy. Species of this group may prove to be of some importance in the decomposition of plant matter, including the dung of herbivores. A wide range of speciation patterns appears to be exhibited by species of Oxytelini. A variety of reproductive isolating mechanisms may frequently be detected within a single genus or species-group. Taxonomic studies involving the collation of morphological, distributional and ecological data will enable more effective comparisons of those situations where reproductive isolation appears to have been achieved as a result of extrinsic factors, and those where intrinsic factors are likely to have been essential ingredients in speciation processes.

I feel that the results of studies on the Oxytelini are most appropriately presented, where practicable, in terms of the component genera and monophyletic groups of species within the genera. The present paper is intended to provide an introduction to the genus *Anotylus* Thomson, as defined here undoubtedly the largest genus of Oxytelini. An account of the taxonomy and a discussion of the phylogeny of the *crassicornis*-group, which is considered to be monophyletic has already been prepared (Hammond, in press). Similar accounts are planned to cover other species-groups of *Anotylus* and other genera of Oxytelini. As *Anotylus* is a large but poorly understood genus, in which many species remain to be described, I have not considered it appropriate to attempt a comprehensive classification of component species-groups at this stage. When all available material has been revised or reviewed, such a classification may be attempted and, if necessary, new generic limits proposed. A fuller discussion of zoogeography and phylogeny will also then be feasible.

As many species-groups within the genera of Oxytelini are distributed in more than one zoogeographical region, taxonomic accounts based on these groups will not necessarily fulfil practical identification needs. For this reason a series of short papers is planned, each of which is intended to enable the identification of the species of Oxytelini to be found within a particular geographical area. Such papers (e.g. Hammond, 1975*a*) are projected only where the area in question is faunistically or otherwise well delimited, and the fauna is considered to be relatively well known.

In the course of studies relevant to the taxonomy of *Anotylus* some tens of thousands of specimens of this genus, as well as at least an equal number of specimens of other genera of Oxytelini, have been examined. Most of this material consists of adults mounted on card rectangles or points and, in most cases, only exoskeletal features have been investigated. Following dissection small and fragile structures, such as genitalia, were examined in glycerine and later generally stored in micro-vials (containing glycerine), pinned beneath the specimen. A Cambridge 'Stereoscan' electron microscope was used to examine surface features at high magnifications, and also for recording purposes (Pls 1–3). Terminology generally follows that of Blackwelder (1936) or Herman (1970).

CRITERIA FOR SPECIES AND SUPRASPECIFIC TAXA

The species definition provided by Mayr (1969), that species are 'groups of actually (or potentially) interbreeding natural populations which are reproductively isolated from other such groups' is followed here. However, such a definition still leaves room for discussion regarding status in certain special cases. It should also be noted that data are frequently inadequate to establish the status of populations studied; in such cases a classification entirely in accordance with Mayr's definition may not be achieved.

For most Oxytelini no direct information concerning reproductive isolation between allopatric populations is available, and the limits of the populations themselves are generally unknown. As information concerning ecology and biology is also extremely sparse, the principal sources from which inferences concerning presence or absence of reproductive isolation may be derived are adult morphology and, to a lesser extent, chorology. However, where sufficient study material and sufficient distributional data are available, sympatric species present relatively few problems. Sister-species of Oxytelini are frequently sympatric and exhibit marked differences in male secondary sexual structures and parts of the male genitalia. In many cases, involvement of these structures as species-specific recognition devices appears likely. Such differences may thus have contributed to successful reproductive isolation rather than have been achieved as a consequence. In this situation, examination of very few males is sufficient to make confident inferences concerning the status of sympatric populations. For allopatric populations, of course, conclusions are much more dependent on the quality of data available concerning distribution and morphological variation within the populations.

In practical terms my treatment of allopatric forms is generally that of a 'lumper'. Where evidence concerning the nature of geographical variation is at all inconclusive, I regard samples from largely similar allopatric populations as conspecific. This does not imply any particular theoretical standpoint regarding the likelihood of reproductive isolation between such populations. I feel merely that a conservative attitude to the formal naming of taxa is appropriate in situations of uncertainty. It may also be felt that the definition of 'macro-species' and discussion of their interrelationships are the prime tasks of broad revisional studies of the members of staphylinid genera at the present time. However, any morphological differences which appear to be exhibited by allopatric components of a 'macro-species' will be noted and possibilities of reproductive isolation between them discussed.

I recognize the value of naming subspecies, in certain instances, even where direct evidence concerning gene-flow between populations is unavailable. However, I feel that the need for formal naming at this level is slight in the case of most Oxytelini. Where subunits of species appear to be recognizable their geographical and morphological features will be noted, but only where good evidence concerning the nature of the interface between subunits is available, and a practical advantage justifies the action, will subspecies be formally named. In certain cases my use of subspecies may also be an expression of uncertainty in relation to allopatric forms which, on the basis of further evidence, may prove to be distinct species.

I agree with Whitehead (1972) that in studies of single genera 'the existing concept of the genus should be accepted unless it is poorly defined or clearly unreasonable'. I therefore accept *Anotylus*, much as defined by the most recent revisor of genera of Oxytelinae (Herman, 1970), as a group of generic rank. Although subgenera are not employed in the present work I consider formal categories of infra-generic rank to be useful in the case of certain large genera. When monophyletic groups of species have been more widely recognized within *Anotylus*, and their phyletic relationships assessed, it may prove appropriate to employ formal subgeneric (or generic) names for groupings subordinate to *Anotylus*, as presently defined.

I accept the principle that a supra-specific taxon should be strictly monophyletic, and the present work attempts consistently to employ cladistic relationships as the basis of classification. Recency of common ancestry, using monophyly in the sense of Hennig (1966), is the basis of my classificatory decisions. However, I agree with Anderson (1974) that acceptance of the principles of the Hennigian approach does not mean that cladistic hypotheses can always be made with confidence. Nevertheless, the only compromises with the phylogenetic method which I wish to make are generally of a practical nature, not ones of principle, as little methodological compromise is possible without disruption of the method's logic. As pointed out by Cracraft (1974), any acceptance of patristic relationships will decrease the information content of a classification. I do not recognize the practical value of accepting paraphyletic groupings as frequently as advised by some workers who adopt a partially cladistic approach (e.g. Whitehead, 1972).

The inclusion relationships arrived at by means of hypotheses concerning the relative recency of common ancestry of taxa are unidirectional. However, in many instances, the possibility of justifying even the approximate equivalence of all taxa of the same rank is slight. For example, insufficient direct or contextual evidence is presently available for such equivalences to be estimated in the Oxytelini. For this reason the formal equivalence in rank of certain taxa will rest on arbitrary criteria. I agree with Noonan (1973) that, because of extinctions, the number of successive branching points in any lineage is generally unable to provide any absolute time scale. Equally, no absolute measure of rates of 'divergence' is available. Equivalence of age is not implied for branching points at the same level in the time axis of cladograms which I present. Although I agree that dichotomous cleavage cannot be regarded as a universal component of all speciation processes, I regard the expression of phylogenetic hypotheses in terms of dichotomies as unexceptionable, especially when reconstructions are made on the basis of the extant fauna only.

My reasons for adopting the 'Hennigian' approach stem from the conviction that systematic studies should attempt to provide hypotheses of service to biological science as a whole. Hypotheses which convey the maximum information concerning the evolutionary events which have led to the range of organisms extant at any given time are those best suited to this end. This point has been well argued by Crowson (1970). As a detailed justification of the value of the phylogenetic approach to classification I find that of Griffiths (1972) the most complete and satisfying. Some additional pertinent points are made by Cracraft (1974). The value of phenetic systems of classification lies in presenting the results of morphological or other research in a convenient manner, but I agree with Griffiths (loc. cit.) and Cracraft (loc. cit.) that the use of the Linnaean hierarchy for this purpose is ultimately unfortunate. Finally, I concur again with Griffiths (loc. cit.) that 'static presentations of the distribution of functional-morphological types should be regarded as special purpose [classificatory] systems', and that 'the phylogenetic system is a general-purpose classification widely useful in many branches of biology, and . . . is the most suitable classification for representation through the Linnaean hierarchy'.

TYPES

Although many different authors, some 95 in all, have contributed descriptions of new species which are today included in the Oxytelini, almost all type-material is, fortunately, extant. Most of this is available for study and I have examined primary type-material relating to about 80% of the relevant names. The evaluation of most type-material of Oxytelini presents few problems. However, individual judgements frequently need to be made regarding the precise composition of type-series. The majority of authors, including four – M. Bernhauer, M. Cameron, A. Fauvel and D. Sharp – who are responsible for some three-quarters of the names currently included in *Anotylus*, did not consistently label all specimens on which new species were based. Syntypes of some species, especially those of Bernhauer and Cameron, have been widely distributed and are to be found in many collections. In certain cases more than one, sometimes several, 'types' of the same species, notably those of Bernhauer and Wendeler, are to be found in different collections. The recognition and evaluation of type-material of species described by J. Stephens and T. Marsham (both collections in BMNH) has been discussed by Hammond (1972). Data enabling satisfactory recognition of syntypical material described by T. Wollaston, compiled by members of the BMNH staff, is to be found in association with the principal Wollaston collection (BMNH); many of the significant points from these notes have been summarized by Johnson (1970).

Type-material of some species included in the present study has not been available for examination. The collection of Eichelbaum (formerly in Zoologisches Museum, Hamburg) is known to have been destroyed by war damage. Some of the species described by that author (1913) from East Africa are probably to be regarded as nomina dubia although, in some instances, apparently syntypical material is to be found in other collections. No type-material of species described by Gistel (1857) is known to exist. Much of the type-material of species described by Fauvel and deposited in the Museo Civico di Storia Naturale, Genoa has not been located. Syntypes of some of these species were retained by Fauvel in his own collection (now in the Institut Royal des Sciences Naturelles de Belgique, Brussels) but remaining syntypes of these species and several unique holotypes could not be found in the Genoa Museum in 1973 (E. Tortonese, personal communication) or 1975 (M. C. Day, personal communication). Despite several requests, material from the important collection of Professor O. Scheerpeltz (Vienna), containing types of species described by Luze as well as the holotypes of many of Scheerpeltz's own species, has not been made available for examination. Requests for loan of type-material of species described by Abdullah & Qadri (Karachi University) have also met with no response.

Lectotypes

A strict interpretation, similar to that of Hayek (1973 : 9), of Article 73 of the *International Code of Zoological Nomenclature,* is followed here. As a result the majority of species included in *Anotylus* are considered to be represented by syntypes. Where taxa are comprehensively revised, as in the case of the *crassicornis*-group (Hammond, in press), lectotypes will generally be designated. Where species are otherwise discussed (e.g. nomenclatural and synonymic notes below) I have refrained from designation of lectotypes. To quote from the *Code,* types afford 'the standard of reference that determines the *application* of a scientific name' (my italics). Unless accompanied by appropriate taxonomic evaluation of types and of the taxon to which they relate, restriction of this standard of reference would appear to be an exercise without taxonomic value.

Except where a clear indication to the contrary regarding ownership exists, lectotypes will be designated from material in museums which house the major part of the relevant author's collection. For the most prolific authors these are: Bernhauer (Field Museum of Natural History, Chicago); Cameron (BMNH); Fauvel (Institut Royal des Sciences Naturelles de Belgique, Brussels).

Nomina nuda

A number of 'manuscript-names' are to be found attached to specimens of *Anotylus* in museum collections. Many such names are the work of Bernhauer and 'types' of his 'manuscript-species' are to be found in many collections. Bierig, Cameron and Fagel also appended a number of these names to specimens in various collections. As some of these names have achieved a certain currency and have sometimes been referred to in published works they are noted where appropriate under the relevant species.

ANOTYLUS Thomson

Anotylus Thomson, 1859 : 44. Type-species: *Oxytelus sculpturatus* Gravenhorst, by original designation and monotypy.

Styloxys Des Gozis, 1886 : 15 [as subgenus of *Oxytelus* Gravenhorst]. Type-species: *Staphylinus rugosus* Fabricius, by virtual monotypy.

Oxytelodes Bernhauer, 1908 : 290. Type-species: *Oxytelodes holdhausi* Bernhauer, by monotypy.

Styloxis Des Gozis; Eichelbaum, 1909 : 119. [Incorrect subsequent spelling of *Styloxys* Des Gozis.]

Emopotylus Bernhauer, 1910 : 359 [as subgenus of *Oxytelus* Gravenhorst]. Type-species: *Oxytelus cuernavacanus* Bernhauer, by monotypy.

Onotylus Thomson; Bernhauer, 1915 : 100. [Incorrect subsequent spelling of *Anotylus* Thomson.]

Boettcherinus Bernhauer, 1936*a* : 82 [as subgenus of *Oxytelus* Gravenhorst]. Type-species: *Oxytelus planaticollis* Bernhauer, by subsequent designation (Steel, 1948 : 188).

Oncoparia Bernhauer, 1936*b* : 214. Type-species: *Oncoparia parasita* Bernhauer, by monotypy. **Syn. n.**

Anotyhus Thomson; Bernhauer, 1938 : 22. [Incorrect subsequent spelling of *Anotylus* Thomson.]

Paracaccoporus Steel, 1948 : 188 [as subgenus of *Oxytelus* Gravenhorst]. Type-species: *Oxytelus ocularis* Fauvel, by original designation.

Boettcherianus Bernhauer; Steel, 1948 : 188. [Incorrect subsequent spelling of *Boettcherinus* Bernhauer.]

Oxytelosus Cameron, 1950*b* : 92. Type-species: *Oxytelus abnormalis* Cameron, by virtual monotypy.

Styloxys Des Gozis; Fagel, 1956 : 271 (in part).

Microxytelus Fagel, 1956 : 272. Type-species: *Oxytelus nitidifrons* Wollaston, by original designation and monotypy.

Anotylus Thomson; Fagel, 1956 : 273.

Oxytelops Fagel, 1956 : 273. Type-species: *Staphylinus tetracarinatus* Block, by original designation and monotypy.

Oxytelosus Cameron; Fagel, 1956 : 274.

Pseudodelopsis Fagel, 1957 : 3. Type-species: *Pseudodelopsis scotti* Fagel, by original designation.

Anotylops Fagel, 1957 : 8. Type-species: *Anotylops seydeli* Fagel, by original designation and monotypy. **Syn. n.**

Oncoparia Bernhauer; Fagel, 1965 : 338.

Anothylus Thomson; Coiffait & Saiz, 1968 : 420. [Incorrect subsequent spelling of *Anotylus* Thomson.]

Metoxytelus Coiffait & Saiz, 1968 : 422. Type-species: *Oxytelus sulcicollis* Gemminger & Harold, by original designation and monotypy. **Syn. n.**

Anotylus Thomson; Herman, 1970 : 414.

Oncoparia Bernhauer; Herman, 1970 : 421.

Anotylops Fagel; Herman, 1970 : 423.

Pseudopyctocraerus Abdullah & Qadri, 1970 : 125 [as subgenus of *Platystethus* Mannerheim]. Type-species: *Platystethus mahmoodi* Abdullah & Qadri, by original designation. **Syn. n.**

Pseudo-pyctocreerus Abdullah & Qadri; Abdullah & Qadri, 1970 : 125. [Incorrect subsequent spelling of *Pseudopyctocraerus* Abdullah & Qadri.]

Neopyctocraerus Abdullah & Qadri, 1970 : 126. Type-species: *Neopyctocraerus shafqati* Abdullah & Qadri, by original designation and monotypy. **Syn. n.**

Neoplatystethus Abdullah & Qadri, 1970 : 127. Type-species: *Neoplatystethus hameedi* Abdullah & Qadri, by original designation and monotypy. **Syn. n.**

Pseudoplatystethus Abdullah & Qadri, 1970 : 129 [as subgenus of *Neoplatystethus* Abdullah & Qadri]. Type-species: *Neoplatystethus meccii* Abdullah & Qadri, by original designation and monotypy. **Syn. n.**

The later citation of *Oxytelus nitidulus* Gravenhorst as type-species of *Anotylus* by Blackwelder (1943 : 91) cannot be accepted as *O. nitidulus* was not originally included. I find myself in agreement with all of Blackwelder's (1952) conclusions regarding the type-species of genera erected prior to 1950, and listed in the synonymy above. Herman (1970 : 414) discusses the fixation of a type-species for *Oxytelosus* Cameron; I agree with his conclusions. However, the type-species of *Boettcherinus* was fixed as *Oxytelus planaticollis* Bernhauer by Steel (1948 : 188) and Blackwelder's designation (1952 : 79), fortunately of the same species, is redundant.

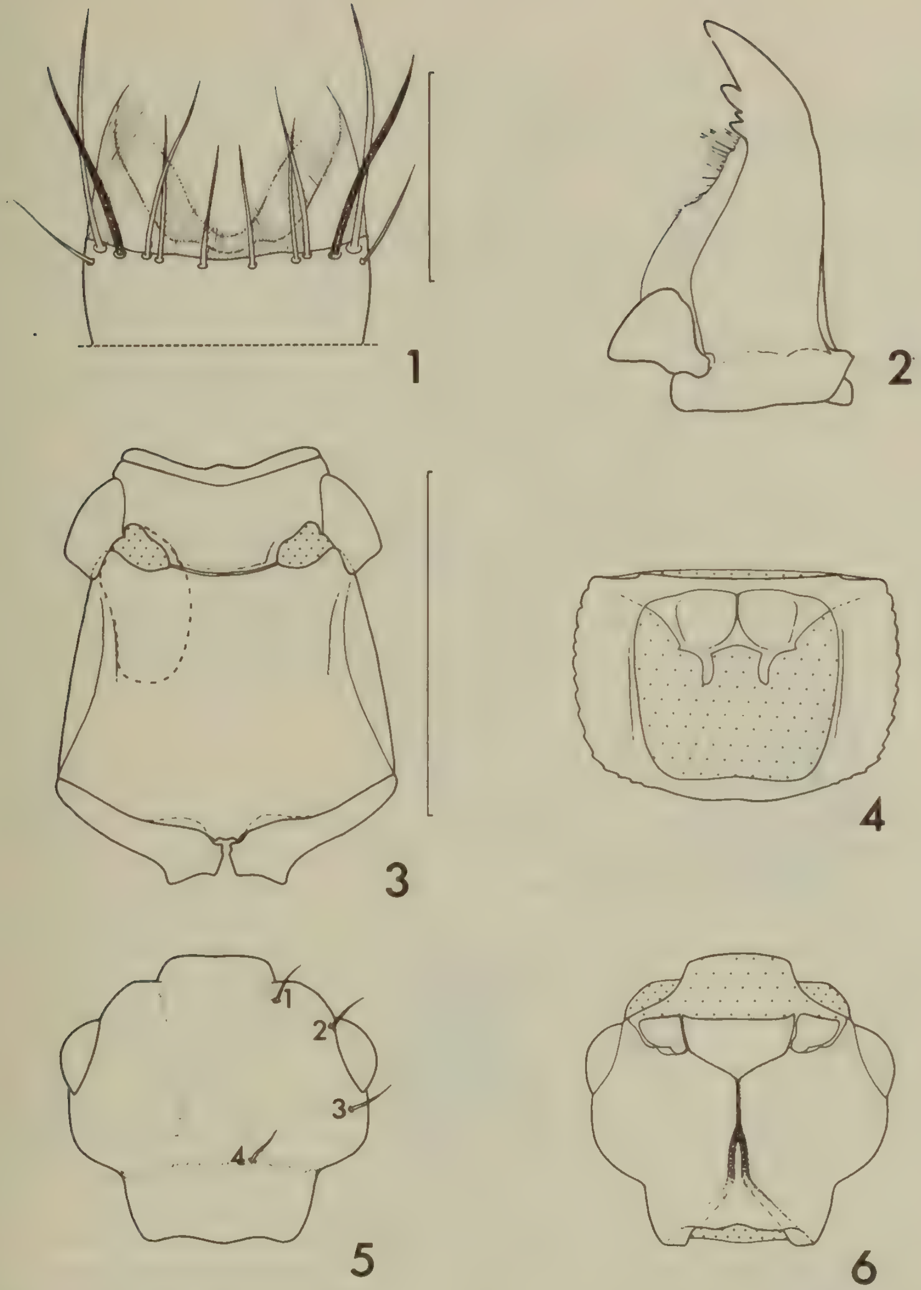
With the characters of Oxytelinae (see Herman, 1970 : 358–360). Length 1·0–7·5 mm. Form moderately broad to narrow, moderately depressed. Surface scarcely to strongly sculptured; pubescence generally inconspicuous.

Clypeus reduced, anterior margin of variable form, clypeal area distinctly or poorly delimited by epistomal groove; supra-antennal prominence generally well developed; gular sutures confluent anteriorly, then sharply divergent and parallel from middle to anterior region of neck, then sharply and continuously divergent to base of neck (Text-fig. 6); base of head constricted to form well-defined neck, vertex frequently demarcated from dorsum of neck by occipital groove (Text-fig. 5). Labrum with anterior margin more or less truncate to broadly emarginate, without median longitudinal suture (Text-fig. 1); mandibles generally with denticulate mesial edge (Text-fig. 2); antenna generally with short, moderately close to close pubescence on at least segments 6 to 11, with some long, tactile setae on all segments; segment 1 of antenna generally the longest, *constricted at base and incrassate apically*; segment 4 of maxillary palpus generally subulate (Pl. 1, fig. 28), narrower than segment 3.

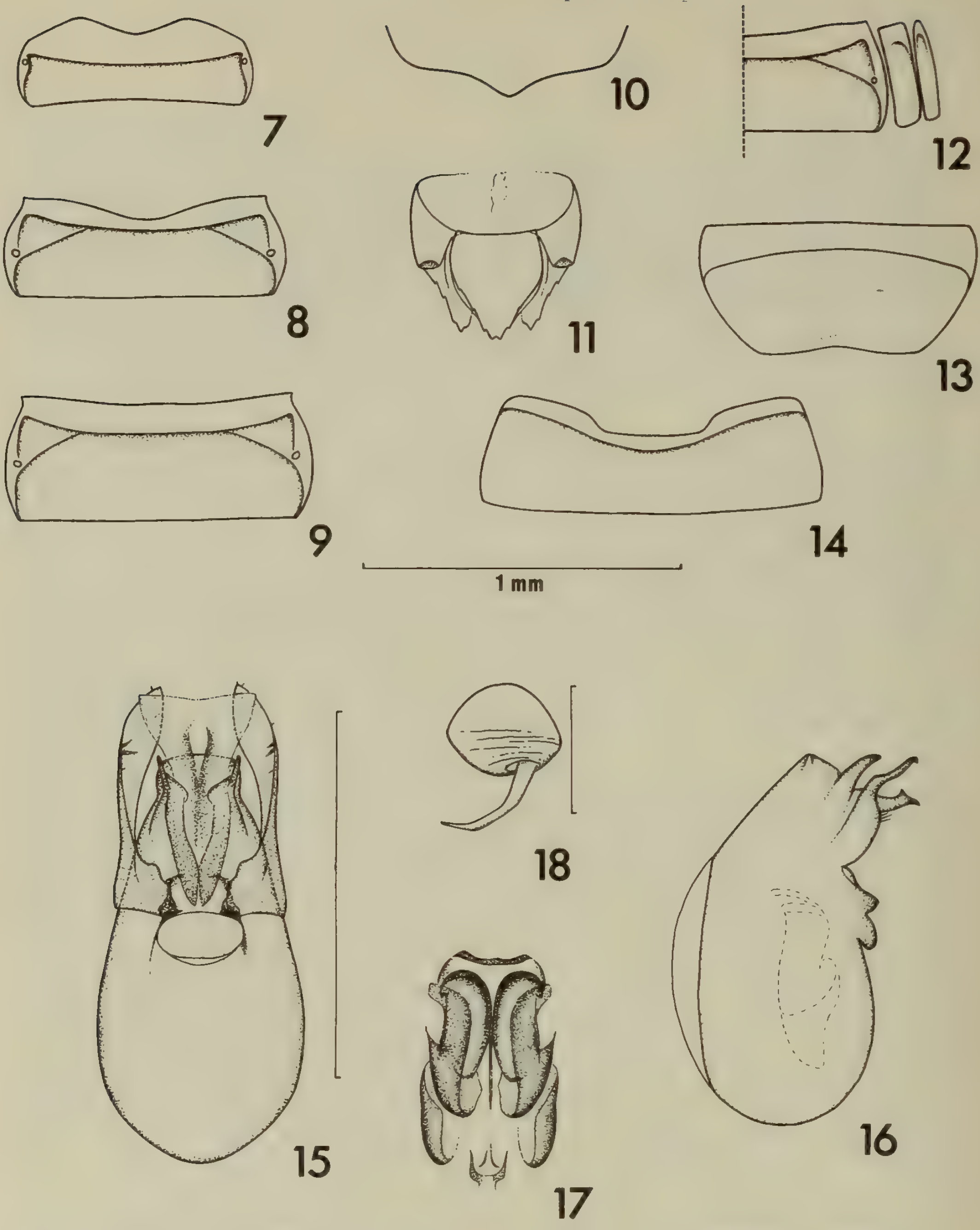
Pronotum transverse; lateral marginal bead present; dorsum generally *with three longitudinal grooves or furrows* on disc; protergosternal suture absent (Text-fig. 4); procoxal fissure absent, protrochantin concealed (Text-fig. 4); postprocoxal lobe absent, prohypomeron generally strongly deflexed and broad (Text-fig. 4); prosternal process short, carinate (Text-fig. 4). Surface of scutellum *with a trilobed impression* (Pl. 2, figs 35–37) (obsolete in *A. leleupi* (Fagel) and *A. parasitus* (Bernhauer)). Elytra transverse to very transverse, generally *not overlapping at suture*. Mesosternal process short, broad, truncate (Text-fig. 3); mesocoxae fairly widely to widely separated (Text-fig. 3) or, occasionally, more or less contiguous (*A. leleupi* and *A. parasitus* only).

Legs fairly short to short; tibiae generally with rows of spines and spinules; pro- and mesotibia generally with some fairly stout spines (Pl. 3, figs 29, 30); protibia frequently with constriction in outer third (Pl. 3, fig. 30); tarsal formula 3 – 3 – 3; first and second tarsomeres frequently of approximately equal length, together generally shorter than third; first and second tarsomeres generally with a few ventral setae flattened and blade-like.

Tergum of 2nd abdominal segment *without basolateral ridge* (Text-fig. 7); terga of 3rd to 7th abdominal segments *with basolateral ridges* (Text-figs 8, 9, 12); 2nd to 7th abdominal segments each with a pair of laterosternites on each side; paratergite and parasternite of most segments



Figs 1–6. *Anotylus stanleyi* (Cameron). (1) Labrum, scale = 0·3 mm; (2) right mandible, same scale as 1; (3) pterothorax in ventral view; the approximate position occupied by the right mesocoxa, when in place, is indicated by the dashed line, scale = 1·0 mm; (4) prothorax in ventral view, same scale as 3; (5) head in dorsal view (appendages removed), same scale as 3; (6) head in ventral view (all mouthparts removed), same scale as 3. Large stippling in figs 3, 4 and 6 denotes the inner surface of an exoskeletal feature.



Figs 7–18. *Anotylus stanleyi* (Cameron). (7) Tergite of 2nd abdominal segment; (8) tergite of 3rd abdominal segment; (9) tergite of 6th abdominal segment; (10) posterior margin of sternite of 8th abdominal segment in ♀; (11) terga of 9th and 10th abdominal segments of ♀ in dorsal view; (12) right half of tergite and right laterosternites of 4th abdominal segment; (13) sternite of 8th abdominal segment in ♂; (14) sternite of 2nd abdominal segment; figs 7–14 all to same scale; (15) ♂ genitalia in ventral view, scale = 0·5 mm; (16) median lobe of ♂ genitalia in lateral view; the position occupied by the internal sclerotized parts is indicated by a dashed line, same scale as 15; (17) internal sclerotized parts of median lobe of ♂ genitalia in ventral view, same scale as 15; (18) spermatheca, scale = 0·1 mm.

frequently of approximately equal breadth (Text-fig. 12), parasternite of 7th segment very narrow; sternite of 2nd abdominal segment well developed, anterior margin as in Text-fig. 14; intersegmental membranes between 2nd to 7th segments with fine, generally weak, sometimes scarcely detectable surface pattern; tergum of 9th abdominal segment frequently divided by 10th tergum; external openings of abdominal glands in tergum of 9th abdominal segment (Text-fig. 11).

♂. Head and pronotum frequently broader than in ♀, sometimes with pronounced secondary sexual modifications of these parts. Abdominal sclerites generally with few outstanding sexual modifications; posterior margin of sternite of 8th abdominal segment generally *of simple bisinuate form* (e.g. Hammond, 1975*a*: figs 59, 60) or more or less truncate (Text-fig. 13); median lobe of ♂ genitalia not very extensively sclerotized, elongate-oval or somewhat egg-shaped (Text-fig. 15), *lacking stout medio-ventral projections*, apico-ventral projections generally slender; internal armature of median lobe weakly to moderately well sclerotized; lateral lobes of genitalia often rather weakly sclerotized, generally of simple form (e.g. Text-fig. 15).

♀. Sternite of 8th abdominal segment with posterior margin of simple form (Text-fig. 10). Spermatheca small, form generally much as in Text-fig. 18.

The generic description given here is fairly brief as modification of generic limits in this area is a likely outcome of ongoing studies of the Oxytelini. A fairly comprehensive definition of *Anotylus*, largely as understood here, has recently been provided by Herman (1970). Characteristics in italics in the description of *Anotylus* above are those which most readily distinguish members of the genus from other Oxytelini. However, most species of *Oxytelopsis* Fauvel and *Rimba* Herman and some species of *Apocellus* Erichson are to be distinguished from species of *Anotylus* only with difficulty.

HISTORY

The concept represented in the present work by *Anotylus* Thomson has only a short history. *Anotylus* was erected by Thomson (1859), for a single species from *Oxytelus*, on the basis of characteristics which are of little significance in the definition of the genus employed here. *Anotylus* has been little used as the valid name of a genus by authors subsequent to Thomson (loc. cit.), but this name and others proposed by Thompson have frequently been employed as subgenera of *Oxytelus*. Little attention was paid to the classification of the Oxytelini during the first half of the twentieth century. The many new species described during this period, principally by Bernhauer, Cameron and Fauvel, were mostly allocated to existing genera on the basis of characteristic gestalt. No attempt is made here to review critically the work of authors who described species of *Anotylus* during this period, although it should be recognized that their species descriptions and large collections now provide a most useful basis upon which modern taxonomic work can proceed. As most species here included in *Anotylus* were, until 1970, contained in *Oxytelus*, the history of the latter genus is largely the history of both. Apart from a few recent works (discussed below), the taxonomic content of work on '*Oxytelus*' during the present century is low, and a complete review would occupy several pages to little advantage. Literature, including key-works, relating to the European fauna is fairly extensive, but accounts of other regional faunas are scarce and largely out of date. Those which retain some value as key-works include that of Fauvel (1878), who provides a key to 18 Australian species now included in *Anotylus*, Casey (1894) with 15 Nearctic species, Cameron (1928) for Sumatra, Cameron (1930*a*) for India, Bernhauer (1936*a*) with 26 species from the Philippines, Bernhauer (1939) who provides a key to 28 small Palaearctic '*Oxytelus*', all of them *Anotylus*, Blackwelder (1943) with 7 species from the West Indies, Hatch (1957) with 7 Nearctic species, and Scheerpeltz (1962) who includes 35 Palaearctic *Anotylus* in a key. However, the only regional review of *Anotylus* which may be regarded as up to date is that included by Hammond (1975*a*) in his account of the Oxytelini of Ceylon.

In recent years two authors (Fagel, 1956; Herman, 1970) have provided new generic classifications which involve species placed here in *Anotylus*. In the same period, some piecemeal erection of new genera, several of which are here relegated to the synonymy of *Anotylus*, has continued. The new genera and subgenera erected by Abdullah & Qadri (1970) for a selection of species collected from dung in Karachi cannot be identified with certainty from the descriptions. However, all of these new taxa appear to be based on species of *Anotylus* and I have few reservations in assigning them to the synonymy of that genus. *Anotylus* was revived as a full genus by Fagel (1956), although used in a much narrower sense than in Herman's (1970) later work or the present account. Fagel's reclassification of genera related to *Oxytelus* Gravenhorst (1956) and supplementary papers on the same theme (1957; 1965) were based principally on the faunas of the Ethiopian and western Palaearctic regions, and are avowedly phenetic in basis. Apart from a more extensive use of illustration and study of male genitalia, the work differs little in type from that of earlier authors, such as Bernhauer and Cameron. The use of 'similarity' in assessing relationships and restriction of study material to that available from certain geographical areas limits the usefulness of Fagel's work above the species level. Herman (1970 : 415–417) has already dealt critically with Fagel's classification of genera related to *Oxytelus*. As I find myself very largely in agreement with Herman in these respects, detailed comment here is unnecessary. Although certain of Fagel's genera are clearly polyphyletic (e.g. *Styloxys*) and include species from widely separated lineages, the characters employed in Fagel's classification are likely to be of some value in assessing relationships in this area. However, the characters, mostly relating to the structure and proportion of parts of antennae, maxillary palpi and legs, require more critical and comprehensive study, and character states will need redefinition. At the specific level I have generally found myself in agreement with Fagel's (1957, etc.) conclusions. Any disagreements generally relate to interpretation of genital features. Male genitalia were examined dry by Fagel and distortion of delicate structures has frequently been reflected in his highly stylized drawings.

Herman's (1970) reclassification of the genera of Oxytelinae was the first major work on Staphylinidae to employ modern phylogenetic methods, and as such is a milestone in work on this family. This work, which incorporates a number of radical proposals, is likely to form the basis of studies on the taxonomy of Oxytelinae for some time to come, and will be referred to frequently by the present writer. At the outset it should be made clear that I find myself in agreement with the greater part of Herman's conclusions. It may be noted that much of this agreement stems from quite independent consideration by Herman and myself of the classificatory problems involved. In some cases the same conclusions have been reached by different routes and by utilizing different sets of characters. Apart from questions of ranking and certain areas which Herman explicitly left unresolved, I find Herman's delimitation of taxa at the generic level largely acceptable and regard almost all as monophyletic units. However, at the tribal level and that which, if so formally named, might be the sub-tribal level in Herman's classification, I find the evidence for monophyly less compelling. My differences with Herman here largely relate to the significance attributed to variations in the structure of the prothorax and pterothorax. The distinctness of two lineages recognized by Herman within his Oxytelini, both of them containing species formerly included in *Oxytelus*, can scarcely be doubted. The distinctive characteristics of what may be termed the '*Anotylus* group' (*Anotylus*, *Oncoparia*, *Oxytelopsis*, *Rimba*, *Apocellus*) and the '*Oxytelus* group' (*Oxytelus*, *Anisopsis* Fauvel, *Anisopsidius* Fagel, *Paroxytelopsis* Cameron, *Hoplitodes* Fauvel) were also noted independently during my own studies. As differences between the two groups, especially those of the scutellum, tergite of 2nd abdominal segment and male genitalia, are so constant and striking, it is only surprising that little or no previous use had been made of these diagnostic characters. I accept Herman's conclusions regarding monophyly of the *Anotylus* group of genera, but have some doubts concerning monophyly of the *Anotylus* and *Oxytelus* groups together. I regard the scutellar impressions (Text-figs 34–37) of the two groups as quite independently evolved, and am by no means convinced that the basolateral ridges of the abdominal tergites are homologous in the two groups. The immediate sister-group of the *Anotylus* group may prove to be *Platystethus* Mannerheim, rather than the *Oxytelus* group.

Within the *Anotylus* group much further study is clearly needed before a satisfactory classification of the many included species can be achieved. As noted by Herman (1970) the genus *Anotylus* itself is presently a receptacle for any members of the *Anotylus* group which lack the apomorphic features employed to define other genera in this group. At the present time, and largely as treated here, *Anotylus* thus represents a taxonomic grouping of considerable practical value, but in need of thorough revision if relationships within the *Anotylus* group are to be clarified. I have included under *Anotylus* only one genus explicitly excluded from its synonymy by Herman (loc. cit.). The apomorphic characteristics employed by Herman (loc. cit.) to support retention of *Oncoparia* as a distinct genus all relate to the loss or reduction of parts, mostly as a concomitant to early loss of flight. Other characteristics exhibited by species of *Oncoparia*, notably those of the male genitalia, suggest that these species share uniquely derived features with species-groups presently contained within *Anotylus*.

MORPHOLOGICAL VARIATION

Even for such an extensive group, including species which occupy diverse vegetational zones and habitats, the range of morphological variation exhibited by *Anotylus* must be regarded as considerable. However, by far the greater part of this variation involves relatively superficial features. Characters particularly useful in establishing major monophyletic groupings are not easy to identify. Relatively cryptic characters, some of which may prove of great value in assessing relationships, have not been extensively studied to date.

Very little is known of the structure of internal organs in *Anotylus*. The ovaries of five British species of the genus were studied by Welch (1964), who found that their ovariole numbers varied from 6–9 to 12. Other Oxytelinae (*Bledius* Leach, *Carpelimus* Leach, *Oxytelus*, *Platystethus*) and most other Staphylinidae examined by Welch exhibited 6 ovarioles per ovary, although the ovaries of *Oxytelus* and *Platystethus*, but not other oxyteline genera, were of the same racemose type as those of *Anotylus*. I have examined the spermatheca of several species of *Anotylus*, all of which proved to be of very similar structure, much as in Text-fig. 18. The testes of all Oxytelinae examined by R. T. Thompson (unpublished work) in the course of a survey of these organs in Staphylinidae were of very similar structure. However, in three species (*Oxytelus laqueatus* (Marsham), *Anotylus sculpturatus* (Gravenhorst) and/or *inustus* (Gravenhorst)?, *Platystethus* sp.), each testis was composed of six follicles, while in the fourth species studied, *Anotylus rugosus* (F.), twelve follicles were contained in each testis. In all four species the subcylindrical follicles opened directly into the long and narrow *vasa deferentia*, and two pairs of long, tubular accessory glands were present.

Use of a scanning electron microscope for the study of surface features has directed attention to several structures which have previously been largely ignored in systematic studies. The arrangement of sensory and other structures on the adoral surface of the labium has already been employed extensively by Herman (1972) in discussions of *Bledius* and related genera. The same author also illustrates *sensilla basiconica* on the apical segment of both labial (1972 : figs 321, 322, 446) and maxillary palpi (fig. 442). Very similar structures are found in *Anotylus* (e.g. Pl. 2, fig. 31), as well as various other Staphylinidae examined, and are assumed to be gustatory in function. Supposed chordotonal organs at the base of the 4th segment of the maxillary palpus (e.g. Pl. 1, fig. 27) were found to be present in all *Anotylus* so far examined. Herman (1972 : fig. 438) illustrates a similar organ in a species of *Bledius*. As I have already noted similarly situated structures of this type in many other Staphylinidae they may be of more or less general occurrence in at least this family of Coleoptera. I have seen no previously published mention of the short, stout setae, present in all *Anotylus* examined, which are located one on each side of the scutellum (e.g. Pl. 2, figs 35–37). However, as I have noted these (e.g. Text-fig. 34), and similar setae located at the base of the 2nd antennal segment (e.g. Pl. 3, figs 25, 26) in several other genera of Staphylinidae, they may also be of widespread occurrence. The form and siting of these setae suggest that they fulfil a proprioreceptive function. The systematic distribution and variation of these and other structures particularly amenable to study with a scanning electron microscope requires further investigation. Many traditionally used characteristics of surface sculpture and vestiture, particularly of the upper surface of the body and the appendages, are already known to be of diagnostic value for both species and species-groups within the Oxytelini. Although many such surface features may be profitably studied with light microscopes, a scanning electron microscope proves a useful adjunct for critical examination, and for clear and accurate illustration (e.g. Pls 1–3).

Certain morphological features exhibited by species of *Anotylus* are clearly correlated with particular habits or habitats. Parallel or convergent developments in such cases are likely to be frequent. For example, a suite of characteristics, including brachyptery, reduction of eyes, dense surface sculpture, etc., is found in many species which inhabit deep forest humus or other cryptic habitats. Although rare in other genera of Oxytelini flightlessness is of fairly common occurrence in *Anotylus* and *Oxytelopsis*. A similar facies is shared by species of several disparate groups of these two genera in which loss of flight has been followed by extensive changes in structure of the thorax and abdominal base, and reduction of the elytra, as well as of the flight wings. Modifications associated with loss of flight are particularly striking in montane African species of *Anotylus*, and reach their extreme expression in *A. leleupi* (Fagel) and *A. parasitus* (Bernhauer). In these two species, both formerly placed in *Oncoparia*, the elytra are vestigial, the central portion of the scutellum is much reduced and lacking in surface impressions and, as a result of great reduction in size of the meso- and meta-sternum, the mesocoxae are more or less contiguous.

Several morphological features may be regarded as typical of those *Anotylus* species which inhabit dung. Unusually stout tibiae bearing numerous blunt spines, presumably an adaptation for burrowing, are found in several groups. Setae which, for Oxytelinae, are of unusual structure occur in a number of the smaller dung-inhabiting *Anotylus*, e.g. *A. fairmairei* (Pandellé), *A. latiusculus* (Kraatz), etc. In these species the major setae on the dorsum of the head, pronotum and abdomen are short, somewhat flattened, and truncate. The few species of *Anotylus* with particularly large eyes and large eye facets, e.g. *A. ocularis* (Fauvel), *A. testaceus* (Motschulsky), etc., are all inhabitants of dung or other particulate and ephemeral habitats. The same types of habitat are occupied by the much greater number of *Oxytelus* species with equally large eyes, e.g. *O. varipennis* (Kraatz), etc. (see Hammond, 1975*a*).

Sexual dimorphism is frequently marked in species of *Anotylus*. Males are generally characterized by a greater development of the fore-parts. In particular, the temples in this sex are frequently large, so that the eyes are less convex and appear to be less prominent than those of females. The antennae and maxillary palpi may also be slightly, occasionally markedly, longer and more robust in males. Species in which males exhibit pronounced secondary sexual modifications of the head, including a variety of horns, protuberances or other outgrowths, sometimes asymmetrical, are to be found in a number of species-groups. Such modifications are commonest and most marked in species native to the Neotropics or the Oriental-Australasian region. In some cases, considerable differences between the sexes in surface sculpture of the head and pronotum are associated with gross structural differences of these parts. The expression of male secondary sexual characteristics of the fore-parts is extremely variable in many *Anotylus* species. Infra-specific variation parallels that well-known in groups such as the Coprinae (Scarabaeidae).

'Major' and 'minor' males may be recognized – those of several species are illustrated by Steel (1948; 1954; 1955) – although a range of intermediates between the most major of males and female-resembling minors generally occurs. Male secondary sexual characteristics exhibited by the sternites of various abdominal segments (most commonly the 7th and/or 8th, occasionally the 5th or 6th) are of general occurrence in *Anotylus*. However, in many instances, much more commonly than in *Oxytelus*, such characteristics are inconspicuous (e.g. *crassicornis*-group discussed by Hammond (in press)). Relatively outstanding male abdominal features are found in a number of species-groups. Some of these have been illustrated by earlier authors, e.g. Cameron (1930), Fagel (1957; 1965), Lohse (1964), Palm (1961), Steel (1954), but those figured represent no more than a small part of the range of variation exhibited by *Anotylus* males.

The characters most useful for species recognition and diagnosis in *Anotylus* vary considerably according to the species-group, and no attempt will be made to discuss these fully here. Size, colour, vestiture, surface sculpture, detailed form and proportions of many different parts, may differ sufficiently to enable ready distinction of closely related species. For reasons already discussed by Hammond (1970) I have found the size of eyes and of eye facets particularly useful in diagnosis of species. However, unusually great infraspecific variation in eye size has been detected in a few *Anotylus* species. Inter-population differences in this respect appear to be exhibited by some species inhabiting tropical forest humus at high altitude (see discussion of *A. besucheti* Hammond and *A. distincticollis* (Cameron) provided by Hammond, 1975*a*). The value of male sexual characteristics for species discrimination is particularly variable in *Anotylus*. Differences between closely related species in male secondary sexual characteristics of the fore-parts may be marked and are frequently diagnostic. However, as noted above, males of many species are polymorphic in respect to development of the fore-parts. In such cases, investigation of the full range of infra-specific variation is essential if males are to be identified on this basis alone. Male abdominal structure varies little in a number of species-groups (e.g. *crassicornis*-group discussed by Hammond (in press), and is frequently of relatively little diagnostic value. Even in some instances where conspicuous abdominal modifications are exhibited by males, interspecific differences may be small and comparative, e.g. species resembling *A. rugosus* (F.). Species-groups in which diagnostic male secondary sexual features are generally lacking may include a few, generally sympatric, species which exhibit pronounced species-specific modifications to the male abdomen. In a few groups, male abdominal modifications differing markedly between closely related species are of more or less general occurrence, e.g. species resembling *A. fairmairei* (Pandellé) and *A. pumilus* (Erichson). It is likely that many structures of this type are involved, as species-specific recognition devices, in the maintenance of reproductive isolation between certain sympatric species. The nature and extent of interspecific differences in male secondary sexual features are particularly varied in *Anotylus*. Further study of these features, therefore, may be instructive with regard to the significance of different speciation patterns with which these various structures are likely to be associated. It is already clear that presence or absence of outstanding differences in male secondary sexual structures, between sister or closely related species, is correlated with particular characteristics of range, habitat and habits.

The primary sexual characteristics of *Anotylus* species have been largely ignored in previous systematic studies. Figures of the male genitalia of a few species have been provided by Coiffait & Saiz (1968), Fagel (1957; 1965), Hammond (1975*a*), Lohse (1964) and Steel (1954; 1955). My own studies to date suggest that the form of the median lobe (Text-figs 15–17), including internal structures, generally differs little between closely related species, and is of limited value in diagnosis of species-groups. The form of the lateral lobes, however, varies in a manner comparable, probably both in structural and functional terms, with male secondary sexual modifications of the abdominal sternites. In many groups differences between closely related species, including those which are sympatric, are slight, e.g. the *rufus*-group (Hammond, 1975*a*: figs 52–55), the *crassicornis*-group (Hammond, in press, figs 6–11, 14–23), etc., while in others they are marked. In at least one group of species, those resembling *A. fairmairei*, strikingly different structures are exhibited by the two lateral lobes of the same individual, rendering the genitalia asymmetrical. In several species-groups a few species only exhibit striking developments of the lateral lobes. For example, the lateral lobes of *A. inustus* (Gravenhorst), *A. plagiatus* (Rosenhauer), and many other members of the '*sculpturatus*-group' are of simple form apically and virtually indistinguishable from each other. On the other hand, in two species of the same group, *A. sculpturatus* (Gravenhorst) and its undoubted sister species, *A. mutator* (Lohse), the apical portion of the lateral lobes is of substantially different structure from that of the others; differences between the two species are also marked.

A discussion of some of the features likely to be of value in constructing a phylogenetic classification of the *Anotylus* group is provided by Herman (1970 : 415–417), and no attempt will be made to expand this greatly here. However, a few of the morphological features which may prove particularly significant in assessing relationships will be briefly considered. I have found a great variety of characters useful in establishing provisional phylogenetic hypotheses concerning the species presently contained in *Anotylus* and other genera of the *Anotylus* group. These include the form of the clypeus and supra-antennal prominences, presence or absence of a post-ocular furrow or ridge, condition of the occipital groove, variations in antennal structure (see below), form and proportions of maxillary palpal segments, form of the pronotum (including condition of the lateral borders, presence or absence of marginal and discal grooves and ridges, form of the elytra (including condition of the suture), form and vestiture of the tibiae, proportions of the tarsal segments and of the tarsus in relation to the tibia, relative breadths of the abdominal laterosternites, chaetotaxy, particularly of the fore-parts (see below), structure of the 9th and 10th abdominal segments and both primary and secondary male sexual characteristics. A number of these characters, although clearly helpful in delimiting minor monophyletic groups, relate to structural features in which parallel developments are likely to be common within the *Anotylus* group. Much of the variation in form and vestiture of the tibiae and tarsi is probably of this type. For example, dorso-ventral flattening of the first tarsomere (found in *Rimba* as well as some

Anotylus species), although likely to have been derived more than once within the *Anotylus* group, is of diagnostic value for those groups in which it occurs. The partial classification of species now placed in *Anotylus* and *Oxytelus* provided by Fagel (1956, etc.), on the basis of 'types' of antennal segment, has been justly criticized by Herman (1970). However, my own studies (unpublished) of antennal variation throughout the Staphylinidae indicate that the antennae of Oxytelini are particularly rich in characters useful at a variety of levels. If due emphasis is placed on detection of the many probable parallel and convergent developments within the *Anotylus* group, antennal characteristics, including details of form, surface sculpture and vestiture of individual segments, as well as presence or absence of basal ridges, may be employed in definition of most monophyletic groups (Text-figs 19–24). A useful antennal character not noted by Fagel (1956) or Herman (1970) is the presence, in *Rimba* and certain groups of *Anotylus*, of a 'dorso-basal plaque' on the second segment, a development facilitating backwards folding of the antennae.

Although of largely similar form in most *Anotylus* (Text-figs 35–37), surface impressions on the scutellum provide information of diagnostic value for certain species-groups. An elongate impression of the type figured by Herman (1970: fig. 45) is characteristic of all members of an undoubtedly monophyletic group of species resembling *A. aliiceps* (Cameron) and *A. mirus* (Bernhauer). The elongate impression of slightly differing form, exhibited by *A. latiusculus* (Kraatz) and a number of similar species, may have been independently derived. Chaetotaxy has been previously ignored in systematic work on Oxytelini and most other Staphylinidae. However, the number and arrangement of setigerous pores on the foreparts has been found useful in diagnosis of *Anotylus* species-groups (e.g. *crassicornis*-group discussed by Hammond, in press). Further investigations are needed before the primitive arrangement of these pores in Oxytelini can be predicated with any confidence.

Certain variations in structure of the 9th and 10th abdominal segments may eventually prove to be of value in recognition of major lineages within the *Anotylus* group. The presence or absence of a V-shaped pattern of spinules on the 10th tergum, first noted by Herman (1970), appears to be useful in the diagnosis of major groups, although it is not yet clear how many times this apparently primitive feature has been lost in *Anotylus*. Other characteristics of the 10th tergum, the extent to which this tergum divides the 9th, and the position of glandular openings in the latter, also appear to be of potential classificatory significance.

Male secondary sexual structures provide much information of value in recognition of monophyletic groups. For example, males of the *rufus*-group (see Hammond, 1975*a*) may be recognized by the presence of characteristic protuberances on the vertex of the head, a feature no doubt uniquely derived in this group. Males of all species in the well-delimited *rugosus*-group exhibit striking yet similar modifications of the abdominal sternites. Male genitalia are also rich in characters useful in assessing relationships. Studies to date suggest that the form of the lateral lobes, which appear to conform to two principal types within the *Anotylus* group, will prove of particular value. Those of one type are more distinctly 'elbowed' basally and, to a greater or lesser extent, embrace the sides and envelop the apex of the medial lobe (e.g. Text-fig. 15), while those of the second type lie flat on the ventral surface of the median lobe and do not envelop its apex (e.g. Steel, 1955: figs 5, 6). Either or both of these types may prove to incorporate conditions which have been uniquely derived within the *Anotylus* group.

NOMENCLATURAL AND SYNONYMIC NOTES ON SPECIES

The notes that follow are intended to supplement the list of species included in *Anotylus* by Herman (1970 : 417–421). It is felt unnecessary to repeat this list here or to provide a comprehensive bibliographical account of those species included, in *Anotylus* by Herman. In most instances no reference to the original descriptions of species is made by Herman (loc. cit.) but these references may be obtained in every case from the catalogues of Bernhauer & Schubert (1911), Scheerpeltz (1933) or the *Zoological Record* for the years following 1931.

The great majority of the 313 species included by Herman (loc. cit.) in *Anotylus* were so assigned on the basis of examination of primary type-material. In all but 10 cases specimens from the original type-series or apparently reliably identified specimens of the species in question were examined. I have also been able to examine typical material of almost all of these species and, without exception, agree with Herman (loc. cit.) regarding their inclusion in *Anotylus* as presently defined. However, further studies demonstrate the need for minor corrections to Herman's list of *Anotylus* species and indicate that a number of other species should be included.

Minor errors in the list of *Anotylus* species provided by Herman (1970).

'*A. curtusi* (Bernhauer)' (p. 418) is a misprint for *A. curtus* (Bernhauer).
'*A. hostilus* (Bernhauer)' (p. 418) is a misprint for *A. hostilis* (Bernhauer).
A. longicornis (Fauvel) was transferred to *Anotylus* from *Delopsis* and not from *Oxytelus* (see Cameron, 1930*a*).
'*A. okahandjanu* (Bernhauer)' (p. 419) is a misprint for *A. okahandjanus* (Bernhauer).
'*A. tibialis* (Brown)' (p. 421) is a misprint for *A. tibialis* (Broun).

Nomina nuda

My attempts to locate descriptions of two of the species included by Herman (1970) in his list of *Oxytelus* species (p. 410) have failed and I believe that both should be regarded as nomina nuda. This list of *Oxytelus* species is of relevance here as the great majority of the species so included where unsupported by examination of type-material or reliably identified specimens are to be transferred to *Anotylus* (see below).

Oxytelus occidentalis Fauvel is listed in the catalogue of Bernhauer & Schubert (1911 : 117) as an Australian species. I have seen no other reference to this name apart from that of Herman (1970 : 410). Bernhauer & Schubert (loc. cit.) refer to a description in *Annali Mus. civ. Stor. nat. Genova* **10** (1877): 199. Although this page is included in a work on Australian Staphylinidae by Fauvel (1877) it contains no mention of *O. occidentalis.* I have also been unable to find any mention of this name elsewhere in the same work, in other works of Fauvel or in the Fauvel collection.

Oxytelus punctiger Scheerpeltz (1933 : 1102) was proposed as a replacement name for *O. punctatus* Broun (1880 : 90), not Leconte (1877). However, no trace of *Oxytelus punctatus* has been found in the work of Broun (1880), in other works by the same author or in the Broun collection (BMNH). *Gryophaena punctata* was described by Broun (1880 : 88) and some confusion with this species is possible although examination of the type (BMNH) demonstrates that, as expected, this species is a member of the subfamily Aleocharinae.

Additions to the list of *Anotylus* species provided by Herman (1970)

The following 56 species, most of them included by Herman (1970) in other genera, are here regarded as members of the genus *Anotylus*, although not included by Herman (loc. cit.) in that genus. These all stand, at least for the moment, as valid species of *Anotylus*; other names included in the present work for the first time in *Anotylus* are noted in the section below dealing with new synonymy. Where primary type-material has been examined this is indicated by the parenthetic use of 'examined'.

A. athenensis (Dvorak, 1954, **comb. n.** (from *Oxytelus*)
A. besucheti Hammond, 1975*a* [examined]
A. brincki (Scheerpeltz, 1974), **comb. n.** (from *Oxytelus*) [examined]
A. bruchi (Bernhauer, 1939), **comb. n.** (from *Oxytelus*)
A. cavicola (Bernhauer, 1926), **comb. n.** (from *Oxytelus*)
A. clavatus (Strand, 1946), **comb. n.** (from *Oxytelus*)
A. corcyranus (Coiffait, 1968), **comb. n.** (from *Oxytelus*)
A. crebratus (Schubert, 1906), **comb. n.** (from *Oxytelus*) [examined]
A. ebonus (Blackwelder, 1944), **comb n.** (from *Oxytelus*) [examined]
A. exiguus (Erichson, 1840), **comb. n.** (from *Oxytelus*) [examined]
A. flavipennis (Kraatz, 1859), **comb n.** (from *Oxytelus*) [examined]
A. forsteri (Scheerpeltz, 1960), **comb. n.** (from *Oxytelus*) [examined]
A. fortesculpturatus (Scheerpeltz, 1964), **comb. n.** (from *Oxytelus*)
A. foveicollis (Scheerpeltz, 1964), **comb. n.** (from *Oxytelus*)
A. gedyei (Bernhauer, 1936), **comb. n.** (from *Oxytelus*) [examined]
A. gibbulus (Eppelsheim, 1877), **comb. n.** (from *Oxytelus*) [examined]
A. hameedi (Abdullah & Qadri, 1970), **comb. n.** (from *Neoplatystethus*)
A. henryi (Fernando, 1960), (from *Deinopsis*, see Hammond, 1975*b*)
A. jarrigei **nom. n.**
= *A. fageli* (Jarrige, 1970 : 60), **comb. n.** (from *Delopsis*), not *A. fageli* Herman (1970 : 418)
A. lateralis (Lea, 1906), **comb. n.** (from *Oxytelus*) [examined]
A. leleupi (Fagel, 1965), **comb. n.** (from *Oncoparia*) [examined]
A. lobatus (Fauvel, 1904), **comb. n.** (from *Oxytelus*) [examined]
A. loebli Hammond 1975*a* [examined]
A. magniceps (Wendeler, 1955), **comb. n.** (from *Oxytelus*) [examined]
A. mahmoodi (Abdullah & Qadri, 1970), **comb. n.** (from *Platystethus*)
A. marginatus (Weise, 1877), **comb. n.** (from *Oxytelus*) [examined]
A. meccii (Abdullah & Qadri, 1970), **comb. n.** (from *Neoplatystethus*)
A. micans (Kraatz, 1859) (from *Oxytelus*, see Hammond, 1975*a*) [examined]

A. micros (Scheerpeltz, 1974), **comb. n.** (from *Oxytelus*) [examined]
A. mixtus (Bernhauer, 1936), **comb. n.** (from *Oxytelus*)
A. mutator (Lohse, 1963), **comb. n.** (from *Oxytelus*)
A. myops (Fauvel, 1877), **comb. n.** (from *Oxytelus*)
A. nitescens (Bernhauer, 1942), **comb. n.** (from *Oxytelus*)
A. oblongifer (Lea, 1931), **comb. n.** (from *Oxytelus*) [examined]
A. occultus (Eichelbaum, 1913), **comb n.** (from *Oxytelus*)
A. parasitus (Bernhauer, 1936), **comb. n.** (from *Oncoparia*) [examined]
A. pedator (Eichelbaum, 1913), **comb. n.** (from *Oxytelus*)
A. peruvianus (Bernhauer, 1941), **comb. n.** (from *Oxytelus*) [examined]
A. planicollis (Scheerpeltz, 1964), **comb. n.** (from *Oxytelus*)
A. plumbeus (Fauvel, 1878), **comb. n.** (from *Oxytelus*)
A. pluvius (Blackwelder, 1943), **comb. n.** (from *Oxytelus*)
A. quinquesulcatus (Bernhauer, 1908), **comb. n.** (from *Oxytelus*)
A. robusticornis (Luze, 1904), **comb. n.** (from *Oxytelus*)
A. sanctus (Scheerpeltz, 1962), **comb. n.** (from *Oxytelus*)
A. seydeli (Fagel, 1957), **comb. n.** (from *Anotylops*) [examined]
A. shafqati (Abdullah & Qadri, 1970), **comb. n.** (from *Neopyctocraerus*)
A. spinicornis Hammond (1975*a*) [examined] = *minutus* (Cameron, 1946) (from *Platystethus*), not *Anotylus minutus* (Cameron, 1929)
A. styricola (Strand, E., 1917), **comb. n.** (from *Oxytelus*)
A. sutteri (Scheerpeltz, 1957), **comb. n.** (from *Oxytelus*) [examined]
A. tasneemae (Abdullah & Qadri, 1970), **comb. n.** (from *Platystethus*)
A. tenuesculpturatus (Scheerpeltz, 1964), **comb. n.** (from *Oxytelus*)
A. trisulcicollis (Lea, 1906), **comb. n.** (from *Oxytelus*) [examined]
A. tunariensis (Scheerpeltz, 1960), **comb. n.** (from *Oxytelus*) [examined]
A. ussuricus (Tichomirova, 1973), **comb. n.** (from *Oxytelus*)
A. v-elevatus (Lea, 1906), **comb. n.** (from *Oxytelus*) [examined]
A. zavadili (Roubal, 1941), **comb. n.** (from *Oxytelus*)

Although most of the species transferred above to *Anotylus* were listed under *Oxytelus* by Herman (1970) their inclusion here in the former genus does not represent any substantial departure from Herman's generic concepts. In the absence of firm evidence from the examination of type-material or elsewhere for their inclusion in *Anotylus* such species were correctly retained by Herman (loc. cit.) in *Oxytelus*. However, I have transferred to *Anotylus* three species, *Oxytelus ebonus* Blackwelder, *O. gedyei* Bernhauer and *Platystethus minutus* Cameron, which were retained in their original genera by Herman (loc. cit.) on the basis of his examination of types. As the typical material which I have examined of each of these species conforms to the diagnosis of *Anotylus* provided by Herman (loc. cit.) as well as to that given here their previous omission from that genus is likely to be due to oversight.

The types of several species retained by Herman (1970) in *Oxytelus* and which remain so placed have not been examined by either that author or myself. Of these, *O. aurantiacus* Fairmaire, *O. brasiliensis* Sahlberg, *O. kaltenbachi* Scheerpeltz, *O. mammillatus* Hochhuth, *O. methnerianus* Bernhauer, *O. murecarius* Bernhauer, *O. novaecaledoniae* Scheerpeltz and *O. tuberculifrons* Eichelbaum are retained in *Oxytelus* pending further investigation, although some are likely to be transferred to *Anotylus* in due course. Types of some of these (see under 'type-material' above) are known to be destroyed or are unavailable for examination. One species of another genus, *Rimba birmana* (Scheerpeltz), is also probably to be transferred to *Anotylus*. In this case a new name may be necessitated due to preoccupation by *Anotylus birmanus* (Cameron). Although transferred above from *Oxytelus* to *Anotylus* one other species must be regarded as a *nomen dubium*. *Oxytelus styricola* was proposed by Strand (1917 : 82) as a replacement name for the preoccupied *Oxytelus humilis* of Gistel (1857 : 18). No Gistel type-material is known to exist and his description of this species renders its recognition uncertain. However, it is likely to be identical with one of the known European species of *Anotylus*, possibly *A. rugifrons* (Hochhuth).

Some of the species newly included in *Anotylus* in the list above, most of them described subsequent to Herman's studies, are not referred to in that author's work (1970). *Anotylus sanctus* (Scheerpeltz, 1962 : 565) appears to have been overlooked. *A. forsteri* (Scheerpeltz, 1960 : 72) and *A. tunariensis* (Scheerpeltz, 1960 : 74) are also omitted from mention by Herman (loc. cit.) and no reference to these species or others described in the same paper (Scheerpeltz, 1960) has been made in the *Zoological Record*. Four other species described in *Oxytelus*, *A. corcyranus* (Coiffait, 1968 : 95), *A. ussuricus* (Tichomirova, 1973 : 158), *A. brincki* (Scheerpeltz, 1974 : 67), *A. micros* (Scheerpeltz, 1974 : 70), two described in *Anotylus*, *A. besucheti* Hammond (1975*a*), *A. loebli* Hammond (1975*a*), one described in *Deinopsis*, *A. henryi* (Fernando, 1960 : 7) and one described in *Delopsis*, *A. fageli* (Jarrige, 1970 : 60) are also additional to those included in the Oxytelinae by Herman (loc. cit.). As Jarrige's description of *Delopsis fageli* clearly demonstrates to me its distinctness from other previously described species of *Anotylus*, in which genus the name is preoccupied, a replacement name has been proposed above.

Although the transfer of *Oxytelus micans* Kraatz to *Anotylus* is noted above it should be made clear that the *Oxytelus micans* of all authors subsequent to Kraatz (1859) is a true *Oxytelus*. This species, widely distributed in the Old World tropics, is now to be known as *Oxytelus puncticeps* Kraatz (see Hammond, 1975*a*). It may also be noted that the species described by Scheerpeltz (1974 : 72) as *Oxytelus* (*Anotylus*) *traegardhi* is a true *Oxytelus* (see below under 'new synonymy').

Other species newly transferred to *Anotylus* fall into the synonymy of species already included in the genus and are referred to in the following section.

New synonymy

As the present work is largely introductory and a prelude to further taxonomic studies of the genus *Anotylus* I have not felt it appropriate to note all of the new synonymies which appear probably justified on the basis of studies to date. In several cases, e.g. *A. exasperatus* (Kraatz) (see Hammond, 1975*a*), allopatric populations which differ morphologically but which may be conspecific are represented by different names which currently enjoy specific status. As further studies may demonstrate an advantage in retaining such names to represent subspecies (or even for different species) no discussion of them is included here.

Two new synonymies are noted below in order to avert any unnecessary introduction of replacement names for junior homonyms. The remaining new synonymies relate to species from faunas which are already well known or to species of the cosmopolitan and adventive type.

Some of the synonymies listed as new below have already been proposed or suggested by earlier authors. Cameron (1934) noted new synonymies involving species described by Motschulsky. Fauvel (1905) placed his own *Oxytelus celebensis* in the synonymy of '*Oxytelus thoracicus* Motschulsky' and recent European authors such as Lohse (1964) have regarded *Oxytelus ixellensis* Dvorak, *O. christianae* Bernhauer and *O. minarzi* Bernhauer as junior synonyms, 'aberrations' or 'varieties' of other species. In each of these cases the synonymies have been overlooked by cataloguers, including Herman (1970), and by the *Zoological Record*. *Aploderus testaceus* Cameron is listed, as such, by Scheerpeltz (1933), but is not mentioned under *Aploderus* or any other genus by Herman (1970). It falls into the synonymy of *Oxytelus testaceus* Motschulsky (now in *Anotylus*).

The following depositories are indicated in the list of new synonymy by the abbreviations which precede them.

MNHU, Berlin	Museum für Naturkunde, Humboldt-Universität, Berlin.
IRSNB, Brussels	Institut Royal des Sciences Naturelles de Belgique, Brussels.
BMNH	British Museum (Natural History), London.
CSIRO, Canberra	C.S.I.R.O. Division of Entomology, Canberra.
DEI, Eberswalde	Deutsches Entomologisches Institut, Eberswalde, East Germany [Now Institut für Pflanzenschutzforschung Kleinmachnow, Abteilung Taxonomie der Insekten.]
ZM, Moscow	Zoological Museum, University of Moscow, Moscow.
MRAC, Tervuren	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
NM, Vienna	Naturhistorisches Museum, Vienna.

Anotylus aliiceps (Cameron, 1950*c* : 181 (*Oxytelus*)). Holotype ♂, Kenya (BMNH) examined].

Oxytelus (*Anotylus*) *transversefoveolatus* Scheerpeltz, 1974 : 69. Holotype ♀ (not ♂ as stated by Scheerpeltz, 1974 : 70), South Africa (University of Lund) [examined]. **Syn. n.**

Anotylus bernhaueri (Ganglbauer, 1898 : 400 (*Oxytelus*)). LECTOTYPE ♂, Austria (NM, Vienna), here designated [examined].

Oxytelus (*Anotylus*) *Minarzi* Bernhauer, 1936*c* : 185. Holotype ♂, Austria (Field Museum of Natural History, Chicago). **Syn. n.** [Already in *Anotylus*.]

Oxytelus (*Anotylus*) *Christianae* Bernhauer, 1939 : 70. Holotype ♂, Austria (Field Museum of Natural History, Chicago). **Syn. n.** [Already in *Anotylus*.]

Anotylus brunneipennis (MacLeay, 1873 : 150 (*Oxytelus*)). Syntypes, Australia (CSIRO, Canberra) [2 ♂ syntypes examined].

Oxytelus (*Anotylus*) *crookesi* Cameron, 1950*d* : 23. Syntypes, New Zealand (1 ♂, 1 ♀ in D.S.I.R., Division of Entomology, Auckland, 1 ♀ in BMNH) [examined]. **Syn. n.** [Already in *Anotylus*.]

Anotylus caffer (Erichson, 1840 : 790 (*Oxytelus*)). Syntypes, South Africa (MNHU, Berlin) [2 ♂ syntypes examined].

Oxytelus picipennis Boheman, 1848 : 295. Syntypes, South Africa (Naturhistoriska Riksmuseum, Stockholm) [2 ♀ syntypes examined] (primary homonym of *Oxytelus picipennis* Stephens, 1834 : 316). **Syn. n.**

Oxytelus bohemani Bernhauer & Schubert, 1911 : 110 (replacement name for *Oxytelus picipennis* Boheman). **Syn. n.**

Oxytelus (*Anotylus*) *Christopherseni* Brinck, 1948 : 28. Syntypes, TRISTAN DA CUNHA (Zoological Museum, Oslo & University of Lund) [5 topotypical specimens examined]. **Syn. n.** [Already in *Anotylus*.]

Oxytelus (*Anotylus*) *rudebecki* Scheerpeltz, 1974 : 66. Holotype ♀, SOUTH AFRICA (University of Lund) [examined]. **Syn. n.**

Anotylus cephalotes (Eppelsheim, 1895 : 66 (*Oxytelus*)). Syntypes, INDIA (MNHU, Berlin & NM, Vienna) [2 ♂, 3 ♀ syntypes examined].

Oxytelus tibialis Schubert, 1908 : 624. Syntypes, INDIA (MNHU, Berlin) [1 ♂ syntype examined], (secondary homonym of *Oxytelus tibialis* (Broun, 1880 : 120 (*Omalium*); synonym of *Anotylus semirufus* (Fauvel)). **Syn. n.**

Oxytelus Schuberti Scheerpeltz, 1933 : 1103 (replacement name for *Oxytelus tibialis* Schubert). **Syn. n.**

Anotylus complanatus (Erichson, 1839 : 595 (*Oxytelus*)). Syntypes, GERMANY (NMHU, Berlin) [5 ♂, 4 ♀ syntypes examined].

Oxytelus (*Anotylus*) *ixellensis* Dvorak, 1954 : 41. Holotype ♂, BELGIUM (Dvorak collection) [topotypical specimens examined]. **Syn. n.**

Anotylus chilensis Coiffait & Saiz, 1968 : 420. Holotype ♂, CHILE (Catholic University of Valparaiso) [topotypical specimens from Saiz collection examined]. **Syn. n.**

Anotylus fragilis (Sharp, 1887 : 691 (*Oxytelus*)). Syntypes, GUATEMALA & PANAMA (BMNH) [13 syntypes (unsexed) examined].

Oxytelus minimus Erichson, 1840 : 789. Syntypes, COLOMBIA (MNHU, Berlin) [2 ♂, 3 ♀ syntypes examined] (primary homonym of *Oxytelus minimus* Runde, 1835 : 20; now in *Carpelimus*). **Syn. n.**

Anotylus impressifrons (MacLeay, 1873 : 150 (*Oxytelus*)). Syntypes, AUSTRALIA (CSIRO, Canberra) [1 ♂, 1 ♀ syntypes examined].

Oxytelus flavior Blackburn, 1902 : 24. Syntypes, AUSTRALIA (BMNH) [1 ♂ syntype examined]. **Syn. n.** [Already in *Anotylus*.]

Anotylus inustus (Gravenhorst, 1806 : 188 (*Oxytelus*)). Holotype (? sex), ?GERMANY (? lost (Knoch collection)).

Oxytelus excavatus Motschulsky, 1857 : 503. Syntypes, ALGERIA (ZM, Moscow) [2 ♂ syntypes examined] (not a synonym of *Platystethus oxytelinus* Fauvel). **Syn. n.**

Anotylus lewisius (Sharp, 1874 : 95 (*Oxytelus*)). Holotype ♀, JAPAN (BMNH) [examined].

Oxytelus (*Anotylus*) *similis* Cameron, 1930*b* : 184. Holotype ♂, JAPAN (BMNH) [examined]. **Syn. n.** [Already in *Anotylus*.]

Anotylus lippensi (Bernhauer, 1943 : 277 (*Oxytelus*)). Syntypes, ZAIRE (IRSNB, Brussels & (?) FMNH, Chicago) [1 ♂ syntype examined].

Oxytelus (s. str.) *armatus* Cameron, 1950*a* : 8. Holotype ♂, ZAIRE (MRAC, Tervuren) [examined] (primary homonym of *Oxytelus armatus* Say, 1823 : 155; now in *Bledius*). **Syn. n.** [Already in *Anotylus*.]

Anotylus marginatus (Weise, 1877 : 96 (*Oxytelus*)). Syntypes, JAPAN (DEI, Eberswalde) [1 ♀ syntype examined].

Oxytelus (*Anotylus*) *sharpianus* Cameron, 1930*b* : 184. Holotype ♀, JAPAN (BMNH) [examined]. **Syn. n.** [Already in *Anotylus*.]

Anotylus nitidulus (Gravenhorst, 1802 : 107 (*Oxytelus*)). Syntypes, GERMANY (MNHU, Berlin).

Oxytelus borealis Motschulsky, 1860 : 119. Syntypes, U.S.S.R. (ZM, Moscow) [11 syntypes examined]. **Syn. n.**

Anotylus pygmaeus (Kraatz, 1859 : 176 (*Oxytelus*)). Syntypes, SRI LANKA (DEI, Eberswalde) [2 ♂, 3 ♀ syntypes examined].

Oxytelus Sauteri Bernhauer, 1907 : 375. Syntypes, JAPAN (Field Museum of Natural History, Chicago; NM, Vienna) [1 ♂ syntype examined]. **Syn. n.** [Already in *Anotylus*.]

Anotylus semirufus (Fauvel, 1878 : 493 (*Oxytelus*)). Syntypes, Australia (IRSNB, Brussels) [4 syntypes examined].

Omalium tibialis Broun, 1880 : 120. Holotype ♀, New Zealand (BMNH) [examined]. **Syn. n.** [Already in *Anotylus*.]

Anotylus subsculpturatus (Cameron, 1928 : 101 (*Oxytelus*)). Syntypes, Sumatra (BMNH) [2 ♂, 1 ♀ syntypes examined].

Oxytelus (*Anotylus*) *masuriensis* Cameron, 1930 : 244. Syntypes, India (BMNH) [2 ♂, 2 ♀ syntypes examined]. **Syn. n.** [Already in *Anotylus*.]

Oxytelus (*Anotylus*) *morbosus* Cameron, 1942 : 106. Holotype ♂, India (BMNH) [examined]. **Syn. n.**

Anotylus testaceus (Motschulsky, 1857 : 506 (*Platystethus*)). Syntypes, 'India Orientali' (ZM, Moscow) [2 ♀ syntypes examined].

[*Oxytelus thoracicus* Motschulsky sensu auct. Misidentification: this species is now in *Coenonica*.]

Oxytelus celebensis Fauvel, 1886 : 145. Syntypes, Celebes (IRSNB, Brussels) [2 ♂, 5 ♀ syntypes examined]. **Syn. n.**

Aploderus testaceus Cameron, 1918 : 65. Syntypes, Singapore (BMNH) [1 ♂ syntype examined]. **Syn. n.**

Oxytelus (*Caccoporus*) *aequicollis* Bernhauer, 1936*a* : 81. Syntypes, Philippines (Field Museum of Natural History, Chicago) (1 ♂ syntype examined]. **Syn. n.**

Anotylus vinsoni (Cameron, 1936 : 201 (*Oxytelus*)). Syntypes, Mauritius (BMNH) [1 ♂ syntype examined].

[*Oxytelus sparsus* Fauvel sensu auct. Misidentification.]

Oxytelus chapini Blackwelder, 1943 : 101. Holotype ♂, Jamaica (United States National Museum, Washington) [4 paratypes examined]. **Syn. n.** [Already in *Anotylus*.]

Anotylus wattsensis (Blackburn, 1902 : 23 (*Oxytelus*)). Syntypes, Australia (BMNH) [1 ♂, 1 ♀ syntypes examined].

Oxytelus curtus Bernhauer, 1904 : 219. Syntypes, Australia (Field Museum of Natural History Chicago; BMNH) [1 ♀ syntype examined]. **Syn. n.** [Already in *Anotylus*.]

Oxytelus fulgidus Fauvel, 1905 : 123. Syntypes, Kenya & 'Zambèse' (IRSNB, Brussels) [4 (unsexed) syntypes examined].

Oxytelus (*Anotylus*) *traegardhi* Scheerpeltz, 1974 : 72. Holotype ♂, South Africa (University of Lund) [examined]. **Syn. n.**

Coenonica thoracica (Motschulsky, 1857 : 504 (*Oxytelus*)). Syntypes, 'India Orientali' (ZM, Moscow) [1 ♂ syntype examined]. **Comb. n.**

Coenonica stricticollis Cameron, 1921 : 241. Syntypes, Singapore (BMNH) [4 (unsexed) syntypes examined]. **Syn. n.**

In addition to the new synonymy listed above, two species listed under *Oxytelus* and seven species listed under *Anotylus* by Herman (1970) have already been relegated to the synonymy of other species of *Anotylus* (Hammond, 1975*a*), and three further synonymies are noted in a discussion of the *crassicornis*-group provided by Hammond (in press).

Two previously unrecognized instances of primary homonymy (*Oxytelus armatus* and *Oxytelus minimus*) are noted in the list of new synonymy above. I have come across two further cases in the genus *Anotylus* where the junior primary homonym represents a species currently regarded as valid. In both of these cases, *A. longicornis* (Fauvel) and *A. pygmaeus* (Kraatz), the species were described in *Oxytelus*. Both names are preoccupied by others which have had no currency as valid names for more than one hundred years. As no useful purpose would appear to be served by replacing the established junior names, they are retained here.

IMMATURE STAGES

The work of Kasule (1966) enables the satisfactory recognition of larvae belonging to the subfamily Oxytelinae. A key to the genera known, as larvae, to that author is provided by Kasule (1968), in which *Oxytelus* (s. l., incorporating *Anotylus*) is included. The very few larvae of Oxytelini which have been characterized, belonging to the genera *Anotylus*, *Oxytelopsis*, *Oxytelus* and *Platystethus*, differ very little amongst themselves in structure. They may be distinguished from larvae of generally similar form of other genera of Oxytelinae which have been described (*Bledius*, *Carpelimus*, *Ochthephilus* Mulsant & Rey, *Thinobius* Kiesenwetter) by the possession of no more than one ocellus on each side of the head. Larvae of *Anisopsidius*, *Anisopsis*, *Apocellus*, *Hoplitodes*, *Paroxytelopsis* and *Rimba*, all of which remain undescribed, are likely to resemble those of the *Anotylus-Oxytelus* group. Likely characteristics of the so far unknown larvae of *Aploderus* and *Paraploderus* Herman are less easy to predict although either or both genera may prove to have much in common with the *Anotylus-Oxytelus* group. A larva, named as *Aploderus caelatus* (Gravenhorst) by association with adults taken in dung, which I have examined (BMNH) is scarcely distinguishable from those of *Anotylus*, but may well prove to be misidentified and belong to a species of the latter genus.

I have encountered published descriptions of larvae of only five species now placed in *Anotylus* and none of eggs and pupae. Larvae of *A. inustus* (Gravenhorst), *A. rugosus* (F.), *A. sculpturatus* (Gravenhorst) and *A. tetracarinatus* (Block) have each been described and figured (as species of *Oxytelus*) by several authors. All, except *A. tetracarinatus*, are included by Paulian (1941). A further species, *A. hybridus* (Eppelsheim), is figured by Pototskaya (1967). The most satisfactory description is probably that of *A. tetracarinatus* given by Verhoeff (1919), who includes notes on the internal organization and life-history of larvae of that species. The larva described by Paulian (1938) as that of *Oxytelus abnormalis* Cameron (now in *Anotylus*) was later recognized by the same author (Paulian, 1941) to be that of a member of the subfamily Aleocharinae.

I have collected and bred larvae of Oxytelini, including *Anotylus*, *Oxytelus* and *Platystethus*, from various parts of the world. Study of these is incomplete, but it is already clear that larvae of these genera are extremely similar. As *Anotylus*, in the sense of the present paper, has only recently been regarded (Herman, 1970) as a genus distinct from *Oxytelus*, it is not surprising that no generic diagnosis relating to larvae is yet available. All *Anotylus* larvae which I have examined share many features with both *Oxytelus* and *Platystethus*. The majority would run to *Oxytelus* in existing keys while some might be referred to *Platystethus*. As many diagnostic characters relating to the proportions of parts are likely to vary considerably within each genus further study is necessary to enable satisfactory generic definitions and a workable key to the larvae of this group of genera.

However, of the few larvae which I have examined those of *Anotylus* have a longer prementum and maxillary palpi in which the penultimate segment is shorter in relation to the apical segment than is the case in *Platystethus*. Larvae of *Oxytelus* (s. str.) examined are more highly coloured, have a broader head and larger and more posteriorly situated ocelli than in *Anotylus*. A further feature in which larvae of *Oxytelus* and *Anotylus* examined differ is more likely to prove to be genuinely diagnostic. Spiracles of *Oxytelus* larvae examined are situated well within the pigmented tergites of the abdominal segments. Those of *Anotylus* are found at the lateral borders of the tergites or within the membrane between the tergites and sternites. This difference may be associated with the different positioning of spiracles in adults of the two genera. It should be noted that the size of larval ocelli is particularly likely to vary within the genus *Anotylus*, in which some adults are virtually eyeless and some species are largely subterranean. In some cases, as noted for the *Oxytelopsis* larva described by Paulian (1941), ocelli may be vestigial or even absent.

What little I have observed of the life-cycle of *Anotylus* species and the duration of larval development largely resembles that documented for *A. tetracarinatus* by Verhoeff (1919) and for *Platystethus arenarius* (Fourcroy) by Hinton (1944). The observations of Hafez (1939) on *Anotylus latiusculus* (Kraatz) in Egypt suggest that development for some species, at least in the warmer parts of the world, may be much speedier. Larvae of this species, which were present in dung on the 4th day after its deposition, pupated within 2 to 3 days and adults emerged some 4 days later. Although Hafez (1939) notes that '*Oxytelus*' larvae which he studied 'probably feed on mites or eggs of other insects' and that those of *A. latiusculus* are 'probably predaceous', all larvae of *Anotylus* which I have bred appeared to feed on the decaying vegetable matter or dung in which they were placed.

BIOLOGY

Little documented evidence regarding the feeding habits of species of *Anotylus* is available, but my own observations suggest that, like most (or all) other Oxytelini, members of this genus are not predators. I have been able to maintain populations of adults and larvae of a number of species from Europe and the Old World tropics through several generations in decomposing vegetable matter or dung which contained no other insects or other invertebrates visible to the naked eye. The belief that members of the subfamily Oxytelinae usually feed on vegetable matter finds expression, generally without documentation, in a number of works on Staphylinidae. The general account of feeding habits in Staphylinidae provided by Voris (1934) demonstrates that most members of the family are likely to be predators but, apart from a record of *Apocellus sphaericollis* Say damaging violets, no specific observations on Oxytelinae are included. Some species of *Bledius* and *Thinobius* are known to feed on algae or other vegetable matter and this habit is likely to be general in those Oxytelinae which burrow in waterside mud or sand. Species of *Anotylus* and allied genera such as *Oxytelus* are generally not ripicolous although this habit is found, apparently as a quite independent development from that of other Oxytelinae in some *Platystethus*. However, the variety of biotopes in which species of *Anotylus* are known to occur provides no conclusive evidence regarding their feeding habits.

Several recent accounts of the coleopterous inhabitants of dung and certain references to individual species of *Anotylus* assert that members of the genus are predatory on Diptera or other arthropods. Horion (1963) notes, without indicating a source, that *Anotylus insecatus* (Gravenhorst) has been recorded as a predator of fly maggots in the bulbs of garden plants. *A. insecatus* is known to be largely subterranean and has been found in numbers in decaying seed potatoes. Evidence for its predatory behaviour in such situations may rest on no more than association of adult *Anotylus* with dipterous larvae. It is not unusual for slender evidence of this type to be used in determining the predatory status of Staphylinidae and other Coleoptera, which further studies show to be saprophagous, mycetophagous or general scavengers. A member of a related genus, *Platystethus americanus* Erichson, is stated by Mohr (1943) to be a predator on the eggs of Diptera in cow dung. Legner & Olton (1970) include the same species in a list of those 'known to be predaceous on muscoid eggs and young larvae' and also include *Anotylus niger* (Leconte) in a list of 'potentially predatory species'. However, evidence in support of these views is not to be found in either of these papers and Wingo *et al.* (1974) demonstrate that *Platystethus americanus* arrives too late at cow manure in Missouri to predate the eggs or larvae of at least some species of Diptera. Lawrence (1954) also notes that most staphylinid larvae are to be found in dung after dipterous larvae have left. Hafez (1939) notes that Staphylinidae arrive fairly late in the succession at dung and, although regarding *Anotylus* larvae as probably predaceous, considers that adults of *A. latiusculus* 'probably feed on dung'.

My own view, based on collection of many thousands of specimens of *Anotylus* and rearing of several species, is that the feeding habits of at least those species which inhabit dung and decaying vegetable matter are likely to resemble those found by Hinton (1944) in *Platystethus arenarius* (Fourcroy). Hinton observed that both larvae and adults of *P. arenarius* would feed exclusively on cow dung, although they were facultative predators, and also noted that larvae of *Anotylus sculpturatus* fed on dung. Further detailed observations are clearly needed before confident generalizations concerning the food of *Anotylus* species and other Oxytelini can be made. The question is of some significance as Oxytelini are frequently very numerous in dung and other accumulations of organic debris. If at least some of them are predators they may play a large part in the control of fly populations. If, as I suspect, they are largely saprophagous or scavengers, they may play a considerable role in the break-down of organic debris, including herbivorous mammal dung in pastures. I know of no species of *Anotylus* or other genera of Oxytelinae which is particularly associated with decaying *animal* matter but records of a few species for carrion may indicate that products of animal putrefaction are also suitable as food.

Although no habitat data or biological information of any kind is presently available for the great majority of species, the range of habitats occupied by species of *Anotylus* is clearly broad. Situations in which European species of the genus have been collected are discussed in many works, notably that of Horion (1963) who comments (under *Oxytelus*) on the life histories and usual habitats of 21 central European species. Such accounts, my own collections made in various parts of the world and label data associated with other material examined enable certain generalizations. Many species inhabit decaying organic matter of various kinds, a number of these principally or exclusively in dung. However, a large number, possibly the majority of species, are inhabitants of humus and leaf litter, primarily in tropical forests. The species of tropical rain forest are generally associated either with humus or rapidly decaying material such as fallen fruit, but not both types of habitat. In the more arid regions of the tropics few species are to be found except in dung. In temperate regions some species may be classified as inhabitants of litter and others are found in dung or decaying plant material of the compost type, while many appear to be catholic in occupation of a variety of habitats where organic debris occurs. The range of habitats favoured by most species of *Anotylus* may be seen as a spectrum in terms of relative permanence and the rate at which putrefaction of the substrate proceeds. The expression of synanthropic tendencies correlates well with this spectrum and, as illustrated below, it is largely those species typical of dung or rapidly decaying accumulations of organic debris which have, frequently with the aid of man, spread to occupy very broad geographical ranges.

A few species of *Anotylus* are known to favour habitats of more restricted occurrence. Several species are to be found occasionally in close proximity to salt water, but only one, *A. perrisi* (Fauvel), a north-west European species, is known to be more or less confined to the marine littoral. Adults and larvae of this species occur most commonly in accumulations of decaying seaweed and other organic material on the seashore. Several species have been collected from the nests of small mammals, two of which – *A. saulcyi* (Pandellé) and *A. bernhaueri* (Ganglbauer) – are known to be more or less confined to such situations. *A. saulcyi* has most frequently been found in the nests of moles but also in those of various mice, rats, hamsters, susliks, rabbits and badgers (Horion, 1963). *A. bernhaueri* is well-known as an inhabitant of burrows of the European suslik and has also been found in moles' nests. In North America *A. neotomae* (Hatch) has been taken in nests of the wood-rat (*Neotoma*), and in Argentina *A. murecarius* (Bernhauer) has been found in nests of *Ctenomys talanum* Thomson. The morphology of an undescribed African species of *Anotylus*, of which I have examined a series taken from the nests of mole-rats, suggests that it may be specially adapted to such situations. The almost eyeless *A. parasitus* (Bernhauer) has been found in association with a rodent's nest in Kenya but, as noted by Fagel (1965), this and the related species *A. leleupi* (Fagel) are likely to be edaphic rather than truly nidicolous. Several species of *Anotylus* are inhabitants of deep humus and may be effectively subterranean, but no evidence is available to suggest that any are truly cavernicolous. The few records of *Anotylus* species from caves all appear to relate to stray individuals. True myrmecophily in *Anotylus* also remains to be demonstrated. *A. placusinus* (Leconte) was described from ants' nests near Washington, U.S.A., and *A. myrmecophilus* (Cameron) from a number of specimens taken from a nest of *Pheidologeton diversus* (Jerdon) in a decayed *Ficus* in southern India. However, like certain European species of *Anotylus* which have, on occasion, been found with ants, the association of these species with ants' nests may be only a casual one. A number of African species of *Oxytelus* and allied genera are commensals of doryline ants while others are termitophilous, but there is no evidence to suggest that species of *Anotylus* found in Africa have similar habits. On the other hand, in South and Central America, species of the closely related genus *Apocellus* (but none of *Oxytelus* or allied genera) appear to be frequently associated with ants.

I have examined a series of an undescribed Australian species of *Anotylus* which exhibits apparently kleptoparasitic behaviour. Although otherwise unknown to me, this species has been taken in numbers from the brood-balls of Scarabaeid beetles of the genus *Cephalodesmus*; individuals have also been observed on several occasions above ground mounted on the backs of and carried by *Cephalodesmus* (G. Monteith, personal communication).

Some species of *Anotylus* are able to achieve a considerable abundance in suitable habitats. For example, Hafez (1939) recorded an average of 808 individuals of *Anotylus latiusculus* (Kraatz) per pound of dung examined in Egypt. Bacchus & Hammond (1972) collected 941 individuals of *A. tetracarinatus* (Block) from 9 lbs 12 oz of donkey dung in England. My own experiences in collecting suggest that, in suitable concentrations of decaying organic material, such population densities are frequently exceeded. The dispersal behaviour of many species, especially those typical of temporary habitats, is such that their general abundance is frequently reflected in the numbers captured in traps for flying insects. As published results relating to trap catches rarely include mention of specifically identified Staphylinidae little quantitative data is available to illustrate this point. However, in samples collected by Freeman (1945) and by Lewis & Taylor (1965) Staphylinidae were more abundant than other families of Coleoptera. '*Oxytelus*' (mostly *Anotylus* in Britain) was one of the three best represented genera of Staphylinidae in Freeman's catches in southern England, while two species of *Anotylus* were among the most abundant of Staphylinidae in Lewis & Taylor's samples from Rothamsted. Omer-Cooper & Tottenham (1934) obtained some 7000 beetles of 81 species by sweeping the air with a hand-net for six hours, at about sunset on July evenings at Wicken Fen, England. *Anotylus nitidulus* (Gravenhorst) was represented in this collection by 4080 individuals, or some 59% of the catch, and *A. tetracarinatus* (Block) by 1920 individuals, 28% of the catch, which also included *A. complanatus* (Erichson), *A. rugosus* (F.) and *A. sculpturatus* (Gravenhorst). While using a net to catch flying insects from a bicycle B. S. Williams (1930) found *A. tetracarinatus* to be the most abundant beetle species captured. It may be noted that this species has been regarded, perhaps with some justification, as the most 'common' of European beetles. In northern Europe, although other small Staphylinidae and various Thysanoptera are also commonly involved, the familiar 'fly-in-the-eye' frequently turns out to be *A. tetracarinatus*.

As may be expected, it is the species typical of temporary habitats which are most frequently taken in flight. Indeed, a number of the species inhabiting relatively stable biotopes, such as forest humus, are wingless or brachypterous.

Although little data is available concerning the periodicity of flight in *Anotylus*, it is clear from anecdotal observations that most species exhibit considerable diurnal and crepuscular flight activity. It is likely that light intensity plays a part in determining the timing of flights in some species; such factors as emergence rhythms are probably of little significance. The role of temperature and humidity thresholds may be considerable and these are likely in many instances to effectively determine the duration of and peaks in flight activity. Variation of flight periodicity between species appears to correlate well with differences in habitat. Lewis & Taylor (1965) found that flight activity of *Anotylus complanatus* (Erichson) at Rothamsted in July 1962 was at a peak between 2 and 3 p.m., while that of *A. tetracarinatus* (Block) was at a peak between 4 and 5 p.m. Although some *Anotylus*, particularly the mat black species inhabiting dung, may exhibit largely diurnal flight activity, many species are abundant at or about dusk and some fly throughout the night. In the tropics night flight is likely to be a regular activity of some species, while in temperate areas nocturnal flight activity generally demands appropriately warm and muggy conditions. Although light-traps, involving as they do an attractant, are unlikely to provide reliable data concerning flight periodicity, the results of such trapping enable some comparisons between species to be made. Unlike many other genera of Oxytelinae, such as *Oxytelus*, *Bledius*, *Carpelimus*, *Thinobius*, etc., relatively few species of *Anotylus* are to be taken at light-traps. For example, in Africa as many as twenty or thirty species of *Oxytelus* may be represented in a single light-trap catch, while *Anotylus* species, even though several may occur in the immediate vicinity, are absent. I have seen no specimens of the generally abundant tropical dung-inhabiting species, *A. latiusculus*, taken at light, although I have frequently operated light-traps within a few feet of habitats containing dense populations of the species. However, diurnal flight of this species has been observed on many occasions and I have examined specimens taken in an aeroplane tow-net during day-time flights over East Africa. I have seen specimens of some twenty species of *Anotylus* taken at light, of which only nine (marked with an asterisk in the following list) have been collected frequently or abundantly in this way: *A. atriceps* (Fauvel), *A. bubalus* (Fauvel), *A. dilutipennis* (Fauvel)*, *A. exasperatus* (Kraatz), *A. glareosus* (Wollaston)*, *A. insignitus* (Gravenhorst)*, *A. loebli* Hammond, *A. nitidifrons* (Wollaston)*, *A. ocularis* (Fauvel), *A. pygmaeus* (Kraatz), *A. rubidus* (Cameron), *A. rufus* (Kraatz)*, *A. rugosus* (F.), *A. sculpturatus* (Gravenhorst), *A. seydeli* (Fagel), *A. sparsus* (Fauvel)*, *A. stanleyi* (Cameron)*, *A. testaceus* (Motschulsky)*, *A. tetracarinatus* (Block), *A. vinsoni* (Cameron)*. The species known to fly to light are generally those of the most ephemeral habitats but include few which are more or less *specific* to dung. Species which have shown themselves to be successful colonists (see below), many of them relatively pale in colour, are particularly well represented in light-trap catches.

As most *Anotylus* species probably breed in as well as feed on decaying organic material, their flight activity includes both migratory and feeding components. There is no evidence to suggest any directly sexual content in these flights and they may conveniently be regarded as dispersal activities. For the species of temporary and highly fragmented habitats dispersal abilities are clearly of great importance.

The extremely rapid dessication of dung in Egypt, described by Hafez (1939), illustrates the speed with which some habitats exploited by *Anotylus* species become unsuitable for continued occupation.

ZOOGEOGRAPHY

As available distributional data for the majority of described species are few, and understanding of relationships between species poor, a full discussion of the zoogeography of *Anotylus* is not yet appropriate. Large numbers of species already represented in collections remain to be described, and many more, no doubt, still to be discovered. However, it is already clear that distributional characteristics exhibited by the genus, its component species-groups and species, are likely to provide considerable phylogenetic evidence, particularly with regard to the relative ages of sub-groups.

Anotylus is well represented in all major faunistic regions, with the exception of New Zealand. Apart from Arctic tundra, extensive deserts, oceanic islands and New Zealand, native species of *Anotylus* probably occur in every part of the world from about 65° N to about 40° S. The species composition of the faunas of certain areas, for example the western Palaearctic, may be regarded as fairly well established, but many species evidently await discovery in most parts of the tropics. The richest areas in species of *Anotylus* are undoubtedly the Neotropical and Oriental-Australasian regions (see Table 1). However, it is in the great centres

TABLE 1

Representation of *Anotylus* in various faunistic regions

Faunistic Region	Described species of *Anotylus*	Probable total number of species of *Anotylus*
Oriental-Australasian	178	270 to 380
Ethiopian-Lemurian	57	130 to 180
Palaearctic	55	64 to 80
Nearctic	12	16 to 25
Neotropical	50	120 to 300
Total	352	600 to 965

Where a species is known to occur in more than one region it is allocated, for the purposes of this table, to that most probably inhabited prior to human influence. Minimum figures for the 'probable total number of species' are based on the actual number of species, both described and undescribed, which I have seen from each region. The maximum figures incorporate a fairly generous allowance for, as yet, undiscovered species, derived by extrapolation from other data.

of endemicity within these regions that the majority of species are to be found. For example, in the Neotropical region, large numbers of species occur in Central America and in the northern Andean area, while the *Anotylus* fauna of Chile and Argentina is likely to be very poor, amounting to no more than four species known to me. In continental Asia certain mountainous areas, notably the Himalayas, hills of southern India, and parts of Burma and south-west China, are rich in endemics. Even greater numbers of species are to be found in the islands of Macronesia and the Australasian area, from Sumatra to New Caledonia. In many instances, relatively small islands appear to support endemic species. For example, an estimated 37 species of *Anotylus* (of which some 34 are probably undescribed) were collected during one recent expedition to the Solomon Islands, many of them from no more than a single island in the group.

In common with many other widely distributed staphylinid genera or monophyletic groups of genera, the representation of *Anotylus*, in proportion to area, is not as great in Africa as in other parts of the tropics. However, the mountainous areas of East Africa and Ethiopia are sufficiently rich in endemics that the total number of *Anotylus* to be found in the continent probably exceeds one hundred. As many as fifty species may eventually be found to occur in Madagascar. The faunas of the Palaearctic and Nearctic regions are poor (see Table 1) in comparison with tropical areas, but many species in the northern continents are widely distributed, and it is likely that a comparable number of species are to be found in any one part of these continents and an area of similar size in many lowland continental regions of the tropics.

No truly oceanic island is known to support any endemic species of *Anotylus*, although certain members of the genus have successfully colonized a number of such islands, largely with the aid of human transport (see discussion of 'adventive species' below). Oceanic islands in which *Anotylus* species are known to be recent colonists include St Helena, Tristan da Cunha, Réunion, Seychelles, Mauritius, Norfolk Island, Kermadec Islands, Chatham Islands, Caroline Islands, Mariana Islands, Tahiti and Hawaii. The few species of *Anotylus* known from Madeira, the Canary Islands and the Azores are also likely to be recent immigrants to these islands. However, one or more of the four species known from Iceland (Larsson & Gigja, 1959) are likely to be native. Certain tropical island groups, such as the Galapagos and Aldabra Islands, although fairly well explored entomologically, are not known to support any species of *Anotylus*, native or introduced. It is also noteworthy that the extensive collections of Staphylinidae from many subantarctic and other islands south of about 45° S, which are now available for study, include no *Anotylus* or any other Oxytelinae.

As studies of the taxonomy and phylogeny of *Anotylus* are far from complete, it would be premature to discuss the distribution of monophyletic groups within the genus at any length. However, some general distributional characteristics at this level are already apparent. The rich Neotropical fauna evidently includes a number of endemic species-groups which, apart from (at least) one group which is also represented in the southern parts of the Nearctic, are apparently unrepresented in and cannot be closely associated with the *Anotylus* faunas of other regions.

No trans-Antarctic relationships appear to exist and further study is required before any sister-group relationships between Neotropical and Old World species-groups can be identified. However, some Neotropical groups appear to exhibit close relationships with the New World genus *Apocellus*. Two fairly small and well-defined species-groups are Holarctic in distribution. Other groups represented in the Palaearctic region include species found in other regions of the Old World. The largest of the Palaearctic groups is particularly well represented in Africa, principally in the mountainous areas of Ethiopia and the east of the continent. Although the included species are of sufficiently varied general appearance to have formed the basis of several recently erected genera (Fagel, 1957; etc.), the few species-groups endemic to the Ethiopian region may generally be readily associated with other Old World groups. Several African *Anotylus* belong to species-groups (e.g. the *crassicornis*-group discussed by Hammond (in press)) which are also well represented in Asia, but not elsewhere. The Lemurian *Anotylus* fauna includes many diverse elements, most of them with no evident close relationships elsewhere. A few Madagascan species may be associated with African species-groups and others with groups found in the nearer parts of Asia. However, the nearest extant relatives of certain endemic species or species-groups are likely to be located further afield, possibly in the New Guinea area, or even in the Neotropics. Much further study is needed to elucidate the interrelationships of the many distinct groups to be found in the Oriental-Australasian region, but it is clear that the majority of species-groups are endemic to the region. Evidently the particularly large *Anotylus* faunas to be found in each of the geographical sub-units in the south-eastern part of this area are also composed largely of groups endemic to each respective unit. For example, it is likely that all species of *Anotylus* known from the New Hebrides belong to a single monophyletic group which is confined to these islands. The same may be true of New Caledonia and of most species found in the Solomon Islands, New Britain, New Guinea and the Philippines. Interrelationships between the major monophyletic groups found in this area are evident, as are associations with groups represented in other parts of the Oriental region. However, the large Australian *Anotylus* fauna appears to be, in the main, of independent origin to that of islands to the north and north-east. Most Australian species of the genus belong to a single monophyletic group which, with the exception of one New Guinean species known to me, is confined to Australia. I have so far been unable to detect any close relationships between this Australian group and other species-groups represented in neighbouring parts of the Oriental-Australasian region.

The many resemblances between *Anotylus* and the large genus *Oxytelus*, in range of morphological adaptation, ecological differentiation, etc., naturally prompt comparison of the distributional characteristics exhibited by the two genera. *Oxytelus* is represented by endemic species in all major faunistic regions, including New Zealand (two undescribed species). However, where *Anotylus* is well represented, *Oxytelus* is frequently poorly so, and generally vice versa. This appears to be true not only of representation in geographical areas but also of ecological niches. For example, in south-east Asia most *Oxytelus* are dung-inhabiting species of broad distribution, while the majority of *Anotylus* in the same area are species of narrow range inhabiting humus or leaf-litter. In Africa, the converse appears to be largely true. Certain lineages within *Anotylus* and *Oxytelus* have converged both morphologically and ecologically, and it is clear that interactions will have influenced the evolution of the two genera and their geographical representation at any given time. Indeed, consideration of the zoogeography and phylogeny of *Oxytelus* may be indispensable in a full discussion of the zoogeography of *Anotylus* and its species-groups.

ADVENTIVE SPECIES

Many of the species of *Anotylus* which inhabit rapidly decaying organic material occupy broad ranges, the extent of which may frequently be due in part to human influence. Most of the widespread species are culture-favoured and able to utilize decaying plant-refuse habitats of the kind created by man in the course of agriculture and other activities, including the dung resulting from animal husbandry. Species of this type which are more or less restricted to but widespread within a single zoogeographical region include *A. clypeonitens* (Pandellé), *A. fairmairei* (Pandellé) *A. inustus* (Gravenhorst), *A. nitidulus* (Gravenhorst), *A. pumilus* (Erichson), *A. sculpturatus* (Gravenhorst), *A. speculifrons* (Kraatz) and *A. tetracarinatus* (Block) in the Palaearctic region, and *A. cognatus* (Sharp) and *A. vicinus* (Sharp) in the eastern Palaearctic-Oriental region. In the Ethiopian region *A. caffer* (Erichson), *A. dilutipennis* (Fauvel), *A. heterocerus* (Fauvel), *A. mirus* (Bernhauer) and *A. stanleyi* (Cameron), and in the Oriental-Australasian region *A. atriceps* (Fauvel), *A. amicus* (Bernhauer), *A. bubalus* (Fauvel), *A. disparatus* (Cameron, *A. hostilis* (Bernhauer), *A. minutus* (Cameron), *A. ocularis* (Fauvel), *A. rubidus* (Cameron) and *A. testaceus* (Motschulsky) fall into the same category. In North America, several species, such as *A. nanus* (Erichson), will probably prove to be widespread. Further taxonomic work is required before other widely distributed elements can be reliably identified in the New World, Australia and elsewhere.

Relatively few species of *Anotylus* appear to have been involved in the kind of faunal exchange which is now well documented for Coleoptera, for example between Europe and North America (Lindroth, 1957). Only such areas as New Zealand and oceanic islands which lack endemic species of the genus have received more than one or two species of *Anotylus* as successful recent colonists. Although relatively few in number, the species of *Anotylus* which have spread, largely by human agency, from one continent to another, are illustrative of a situation which is quite common in the family Staphylinidae as a whole. Truly cosmopolitan species may be lacking in this family, but those which may be classed as subcosmopolitan are likely to exceed one hundred. Although some of these species exploit the dung of domestic mammals, a number, despite the contrary view expressed by Moore & Legner (1974), do not inhabit dung and few are specifically associated with this habitat. Some nine species of *Anotylus* are known to me to be distributed, probably adventitiously, in more than one zoogeographical region. As successful colonists, many of them probably still expanding their ranges, these species are of special interest, and are discussed below. It is hoped that the notes provided will help to avoid further re-description of these adventive species in regional faunistic works.

A. complanatus (Erichson)

A. complanatus, which is characterized in a number of works dealing with European Staphylinidae (e.g. Lohse, 1964; Palm, 1961), belongs to a species-group with representatives in the Palaearctic region, India and Ethiopia. It is undoubtedly of western Palaearctic origin and today is widespread from Morocco to Scandinavia in the north, and from the Azores to the Caucasus in the east. In northern Europe, including the British Isles, it is almost entirely confined to man-made habitats, and is likely to have extended its original range into these areas and others such as the Atlantic islands as a result of human activity. Although its Palaearctic range and habits suggest that *A. complanatus* exhibits only a slightly greater degree of synanthropy than other widespread species (such as *A. clypeonitens*, etc.) found in the same areas, unlike most other Palaearctic species, it has achieved successful colonization far afield. *A. complanatus* is already known to occur in New Zealand which, as noted above, appears to lack endemic species of *Anotylus*. Specimens which I have seen indicate that *A. complanatus* is probably now common and widespread in that country, and was introduced there, in this case clearly by man, at least one hundred years ago. I have been unable to confirm records of *A. complanatus* for Argentina (Blackwelder, 1944, etc.), but have seen recently collected specimens from Chile (see list of new synonymies above).

A. glareosus (Wollaston)

This species, of undoubted Asian origin, is today almost cosmotropical in distribution. *A. glareosus* has recently been discussed by Hammond (1975*a*), who lists countries and regions (including parts of Asia, Africa, Central America, the West Indies, and islands in the Atlantic, Pacific and Indian Oceans) where the species has been found. Diagnoses of the species are provided by Wollaston (1854), Cameron (1930*a*), Blackwelder (1943) and Hammond (loc. cit.). Although a typical 'island species', *A. glareosus* is neither an inhabitant of dung nor restricted to synanthropic habitats. All other members of the species-group to which *A. glareosus* belongs appear to be inhabitants of forest leaf litter, and are confined to the Oriental region, where they are mostly very locally distributed. Like them, *A. glareosus* is to be found in leaf-litter of primary forests, but also is apparently able to exploit accumulations of vegetable debris in secondary forest or under crop plants. Unusually for a forest litter species it is known to fly to light. Although the spread of *A. glareosus* from Asia has undoubtedly been achieved by means of human agency, perhaps with plants such as bananas, its success as a colonist is probably largely due to intrinsic factors.

A. insignitus (Gravenhorst)

A. insignitus belongs to a Neotropical species-group and is likely to be of Central

American origin. Today it is widespread if not generally distributed within the warmer parts of the New World. I have seen specimens from Brazil, Costa Rica, Mexico, U.S.A., Jamaica, Madeira, Mauritius, Réunion and Tahiti. Records for several other countries and regions in South and Central America and the West Indies are provided by Blackwelder (1944). Although not known to be established in any of the Old World continental land masses, *A. insignitus* is one of the very few Staphylinidae of New World origin to have successfully colonized other regions. The record for France noted by Fauvel (1902) relates to a casual introduction at Marseilles. A useful diagnosis of the species is provided by Blackwelder (1943); the presence of a median clypeal horn will enable the distinction of males from those of other *Anotylus* in most parts of the Old World. Dung of various kinds is the most frequently recorded habitat for *A. insignitus* but specimens have also been taken in compost and heaps of decaying vegetation and, in large numbers, flying to light.

A. latiusculus (Kraatz)

This is the only species of *Anotylus* of undoubted African origin which is known to occur in more than one zoogeographical region. *A. latiusculus* has recently been discussed by Hammond (1975*a*) who lists the countries and regions where it has been found. It is widespread in Africa and Asia and is also known from Madagascar, Australia and the warmer parts of the Palaearctic region, from Cyprus to Japan. A diagnosis of *A. latiusculus* is provided by Cameron (1930*a*) and the species is briefly characterized by Hammond (1975*a*) with the aid of a figure. *A. latiusculus* is apparently strictly confined to dung. Although individuals are frequently taken in flight there are no records relating to specimens procured at light-traps. Its occurrence in some of the most arid parts of southern Africa demonstrate efficient dispersal abilities. However, transport by man may be a relatively unimportant factor in the spread of this species which, unlike many other widespread tropical Staphylinidae, cannot be regarded as an 'island species'.

A. mimulus (Sharp)

Although recorded to date only from Japan this species is likely to be widely distributed in the cooler parts of eastern Asia, as I have seen specimens from northern and eastern China and the Vladivostok area of the U.S.S.R., as well as from a number of Japanese localities. Recently, I have also seen specimens from the U.S.A., taken at Joliet, Illinois, in 1953, and from Chile, taken between 1953 and 1958 in the Santiago district. Transport by human agency is almost certainly responsible for the presence of *A. mimulus* in the New World. A number of other Staphylinidae of eastern Asian origin have spread to other continents during the present century, most notably *Philonthus rectangulus* Sharp, and further spread of *A. mimulus* may be expected if a similar pattern to these species is followed. I have seen specimens of *A. mimulus* taken from the dung of herbivorous mammals and from human excrement. It may also inhabit decaying plant debris. There are no records to date of its occurrence at light. *A. mimulus* resembles several other Palaearctic species of the '*sculpturatus*-group' but may be readily distinguished from other New World species of the genus by a combination of its size – 3 to 4 mm in length, shining black appearance, large puncturation of the fore-parts and, in males, presence of two small tubercles at the posterior margin of the sternite of the 7th abdominal segment.

A. nitidifrons (Wollaston)

This species has recently been discussed by Hammond (1975*a*) who lists countries and regions where it has been found. Although of undoubted Asian origin it was first described from St Helena. It is now known to occur in parts of Africa, Madagascar and islands in the Atlantic, Indian and Pacific Oceans, as well as in many parts of Asia. It is a typical 'island species', of decidedly synanthropic habits, found in decaying vegetation of various kinds although apparently not in dung; it has frequently been taken at light. Diagnoses of *A. nitidifrons* are provided by Cameron (1930*a*), Hammond (1975*a*) and others. Apart from in south-east Asia, where several very similar species are to be found, *A. nitidifrons* may generally be recognized by a combination of the following features: largely yellow colour, head (somewhat variably) darker; shining appearance; absence of reticulate microsculpture from fore-parts; presence of a longitudinal furrow alongside the eye; length 2·8 to 4 mm.

A. pygmaeus (Kraatz)

This species, of probable Asian origin, has recently been discussed by Hammond (1975*a*). Although further taxonomic work is required before the limits of *A. pygmaeus* may be reliably established, it is clear that it is widespread in the warmer parts of the Old World, as I have seen specimens which I am confident belong to this species from parts of Africa, Madagascar, northern Australia and islands in the Pacific Ocean, as well as from many parts of Asia. This wide distribution is undoubtedly due in part to spread by human agency. *A. pygmaeus* exhibits pronounced synanthropic tendencies and is frequently found in plant refuse heaps, stable manure and human excrement, as well as in more 'natural' accumulations of organic material. Diagnoses of this species are provided by Cameron (1930*a*) and Hammond (1975*a*), who also includes a figure. However, as very similar species are to be found in most zoogeographical regions, confident identification requires careful comparison with reliably named specimens of *A. pygmaeus* and other species.

A. rugosus (F.)

This species is characterized in a number of works dealing with European Staphylinidae (e.g. Lohse, 1964), and belongs to a well-defined species-group which, excluding *A. rugosus*, has some 7 Palaearctic and 2 Nearctic representatives. All other members of this group are much more local and frequently more restricted in habitat than *A. rugosus*, which is very widely distributed in the Palaearctic, from western Europe to the Irkutsk region, and from Italy to the Arctic Circle. It is also widespread in North America; I have seen numerous specimens from many parts of the U.S.A. and Canada, including Newfoundland. Although *A. rugosus* has been regarded by some authors as an inhabitant of dung, compost and similar habitats, it would appear to be typically a species of leaf litter, moss, and vegetable debris in waterside or marshy situations. It is certainly found occasionally in compost but its habits appear to be scarcely synanthropic, and it may be only marginally, if at all, culture-favoured. A naturally broad Palaearctic range is indicated for *A. rugosus*, but the history of its occurrence in North America requires further investigation. I have seen New World specimens dating from about one hundred years ago from several parts of Canada and the U.S.A. As *A. rugosus* is found commonly in Europe north to at least the Arctic Circle and is also known from Iceland (Larsson & Gigja, 1959) it may prove to be one of the very few truly Holarctic species of Oxytelinae. However, introduction by human agency is undoubtedly responsible for the presence of *A. rugosus* in New Zealand. Records indicate that the species was well established in that country at least one hundred years ago, and today is widespread. I have also seen specimens from the (relatively) nearby Chatham Islands. The success of *A. rugosus* as a colonist in New Zealand (and possibly also in North America) is not accounted for by any marked synanthropy. However, in northern Europe it must be regarded as one of the most nearly ubiquitous and generally abundant species of Staphylinidae. The same intrinsic factors may be responsible for both this status and successful recent colonization.

A. vinsoni (Cameron)

Originally described from Mauritius, this species has remained otherwise unrecorded. However, the majority of previous records for *A. sparsus* (Fauvel) are to be referred to *A. vinsoni*. Both species belong to a group which, apart from adventive occurrences of *A. vinsoni*, is restricted to Australia and neighbouring island groups. Scheerpeltz (1935) regarded *A. sparsus* as widespread, and one of the commonest species of '*Oxytelus*', over the whole of the Australian continent, New Guinea, Celebes and the eastern Sunda Isles. Fauvel (1903) gives records of *A. sparsus*, in addition, for New Caledonia, Java, Sumatra, Mauritius and Réunion. I have seen specimens of the true *A. sparsus* to date only from the Australian mainland. Most other records for this species are likely to relate to *A. vinsoni*, which I have seen from most of the countries noted above, and also from Hawaii, Tahiti, the Kermadec Islands, Kenya, Tanzania, Cuba and Jamaica. The present almost cosmotropical distribution of *A. vinsoni* is undoubtedly due largely to spread by human agency, probably originally from Australia. Large numbers have been taken flying to light, and the species has otherwise most frequently been recorded from decaying vegetable matter and dung. I have also seen specimens found in cat faeces, tortoise excreta, 'nest debris' and leaf-mould. A diagnosis of *A. vinsoni* (as '*Oxytelus chapini*') is provided by Blackwelder (1943 : 101). In Australia and neighbouring island groups several very similar species are to be found, but elsewhere *A. vinsoni* may be recognized by the following combination of features: length 1·8 to 2·2 mm; fore-parts very smooth and shining, almost completely unsculptured; pronotum yellow, without, or with very weak traces of longitudinal furrows.

Apart from the nine species discussed above several others have clearly extended their original ranges, probably with the aid of human transport, although have not succeeded in colonizing other continents. For example, *Anotylus caffer* (Erichson) occurs on Tristan da Cunha, where it is no doubt a fairly recent immigrant, as well as over a large part of southern Africa. Several species of Australian origin, including *A. brunneipennis* (M'Leay), *A. semirufus* (Fauvel), *A. varius* (Fauvel) and *A. wattsensis* (Blackburn), are today found in New Zealand, from whence some of them have been re-described (see list of new synonymies above). One of these, *A. semirufus*, appears to have been particularly successful as a colonist in New Zealand and has also been found on Norfolk Island and the Kermadec Islands.

The ranges of some species of *Anotylus* are likely to be less extensive than reputation currently indicates. The supposedly Holarctic distribution of many species of Staphylinidae frequently derives from instances where New and Old World forms may, in fact, differ specifically. Further study is required before conspecificity of North American populations resembling those of *A. nitidulus* (Gravenhorst) and *A. tetracarinatus* (Block) in the Palaearctic can be predicated with any confidence. However, I have no doubts concerning the conspecificity of Old and New World individuals of *A. rugosus* (F.) but, as noted above, this species may be present in North America as a result of introduction by human agency. Records of *A. tetracarinatus* from Java almost certainly relate to one of several similar Asian species. I have been unable to confirm any extra-Palaearctic records for *A. sculpturatus* (Gravenhorst). Specimens so identified of African origin, which I have examined, all prove to be *A. caffer* (Erichson).

FOSSILS

I have encountered no references to fossil Coleoptera which have been attributed to *Anotylus* but several authors have assigned specimens to *Oxytelus*. Of these, the five listed below have been described as new species.

Oxytelus proaevus Heer, 1862 : 45, pl. 3, fig. 5. [Miocene]
?*Oxytelus levis* Förster, 1891 : 368, pl. 11, fig. 14. [Middle Oligocene]
Oxytelus ominosus Förster, 1891 : 367, pl. 11, fig. 13. [Middle Oligocene]
Oxytelus subapterus Wickham, 1913 : 11, pl. 3, fig. 4. [Miocene]
Oxytelus pristinus Scudder, 1876 : 79. [Oligocene]

The original descriptions and illustrations pertaining to the first four of these species, are lacking in diagnostic details. However, it is unlikely that they all belong to *Oxytelus* (s. l., including *Anotylus*), or even, in some cases, to the Oxytelinae.

Scudder's original description (1876) of *Oxytelus pristinus* from the Rocky Mountain Tertiaries is suggestive of a modern *Anotylus* of the *rugosus*-group, but without examination of the type, uncertainty regarding the generic placement of this species must remain.

Several species of *Anotylus* have now been identified from late Pleistocene insect assemblages in Europe. Every specimen which I have examined is referable to a known extant species, but two of those found in British Weichselian assemblages demonstrate that striking adjustments of range have occurred during the late Pleistocene. *Anotylus gibbulus* (Eppelsheim) has now been found at several British sites (e.g. Coope, 1970 : 115). Today it is known only from the western Caucasus, and the species-group to which it belongs is otherwise represented only in the Ethiopian region. I have also recently examined *Anotylus* elytra from a British site which are undoubtedly referable to *A. mendus* (Herman), a species which is today found only in a restricted area of eastern Europe, from Austria to south Russia.

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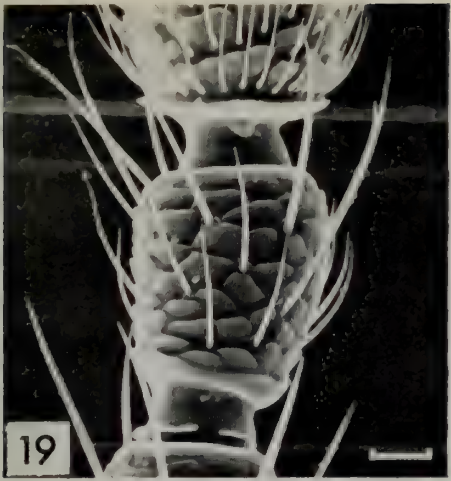
PLATE 1

Antennal segments of *Anotylus* species

Fig. 19. Segments 3–5 of *rugifrons* (Hochhuth), neg. E5/417.
Fig. 20. Segments 5–7 of *rugosus* (F.), neg. E5/410.
Fig. 21. Segments 4–5 of *nitidifrons* (Wollaston), neg. E3/608.
Fig. 22. Segments 4–5 of *amicus* (Bernhauer), neg. E3/607.
Fig. 23. Segments 4–7 of *discipennis* (Fauvel), neg. E5/418.
Fig. 24. Segments 4–5 of *hamuliger* (Fauvel), neg. E5/419.
Scale lines represent 20 μm in each case.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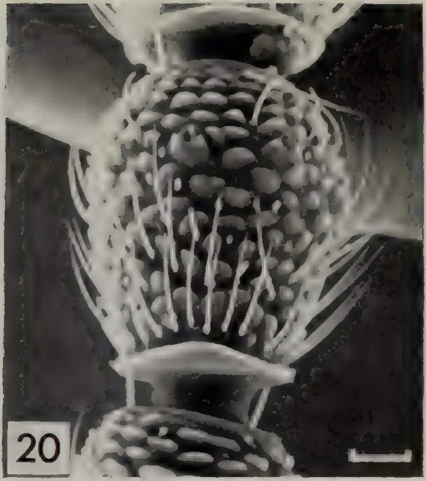
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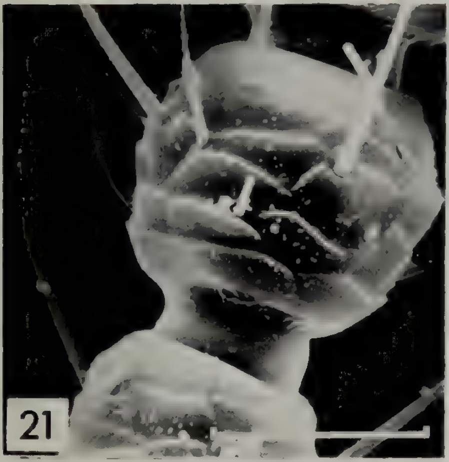
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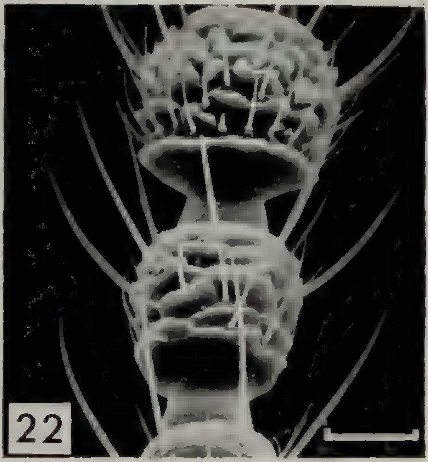
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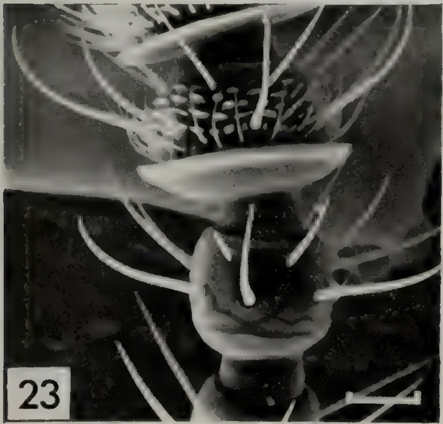
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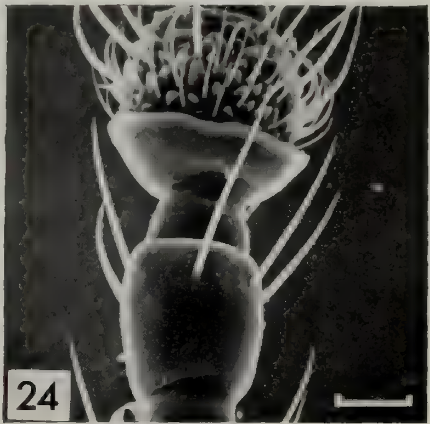
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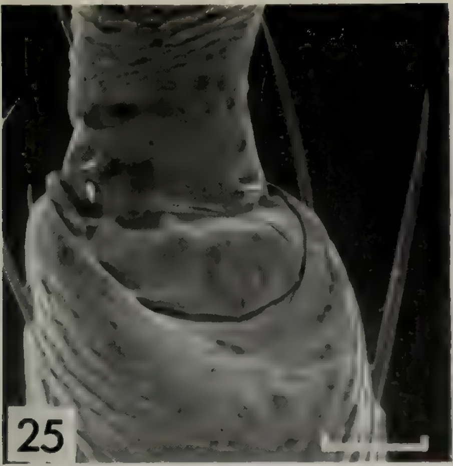
PLATE 2

Anotylus species

FIG. 25. Articulation of antennal segments 1 and 2 in an undescribed species from Nigeria, neg. E10/439.
FIG. 26. Antennal segment 2 of *crassicornis* (Sharp) ♂, neg. E10/484.
FIG. 27. Supposed chordotonal organ at base of terminal segment of right maxillary palp of *stanleyi* (Cameron) ♂, neg. E10/454.
FIG. 28. Right maxillary palp of *stanleyi* (Cameron) ♂, neg. E10/452.
FIG. 29. Left protibia of *stanleyi* (Cameron) ♂, neg. E10/497.
FIG. 30. The same, neg. E10/347.
FIG. 31. Gustatory organs on terminal segment of labial palp of *stanleyi* (Cameron), neg. E10/349.

Scale lines represent 20 μm in each case, except fig. 31 where the line equals 5 μm.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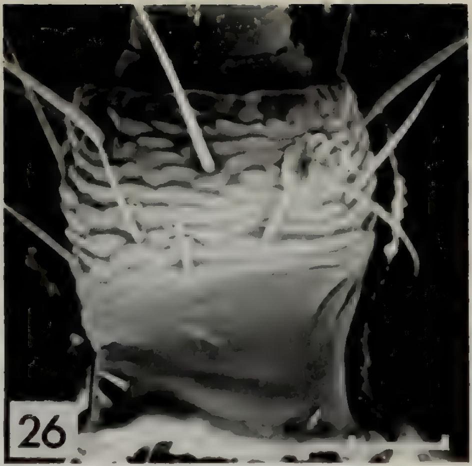
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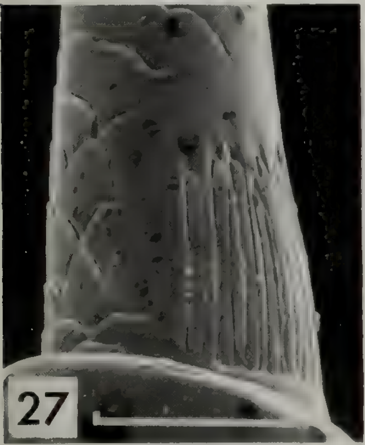
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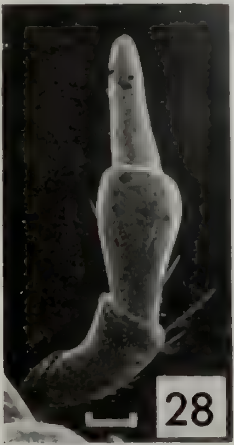
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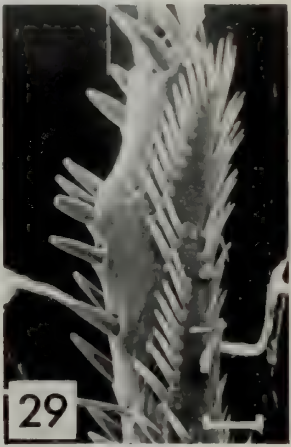
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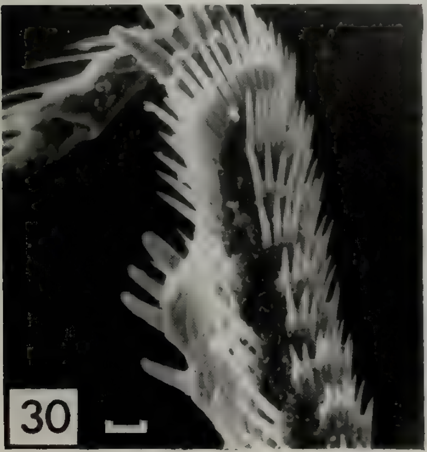
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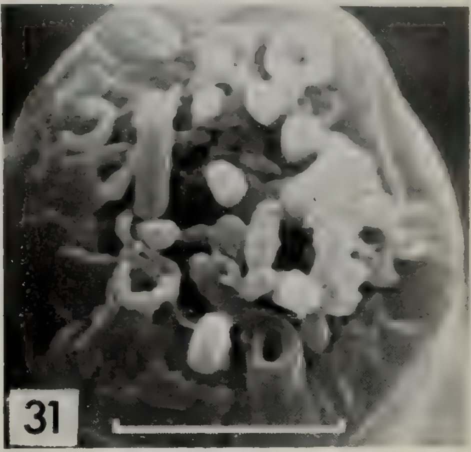
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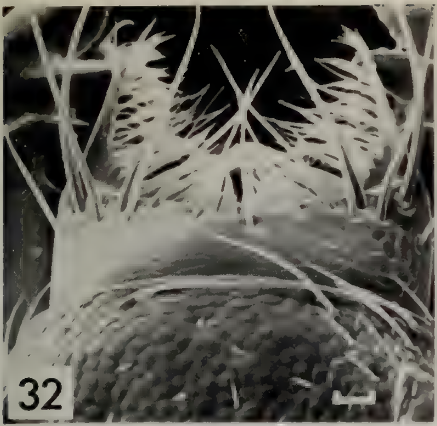
PLATE 3

FIG. 32. Labrum of *Anotylus dilutipennis* (Fauvel), neg. E10/493.
FIG. 33. Left maxilla of *A. stanleyi* (Cameron) ♂, neg. E10/345.
FIG. 34. Scutellum of *Oxytelus planus* Fauvel, neg. E6/70.
FIG. 35. Scutellum of *Anotylus saulcyi* (Pandellé), neg. E5/393.
FIG. 36. Scutellum of *A. complanatus* (Erichson), neg. E5/389.
FIG. 37. Scutellum of *A. fairmairei* (Pandellé), neg. E5/394.

Scale lines represent 20 μm in each case.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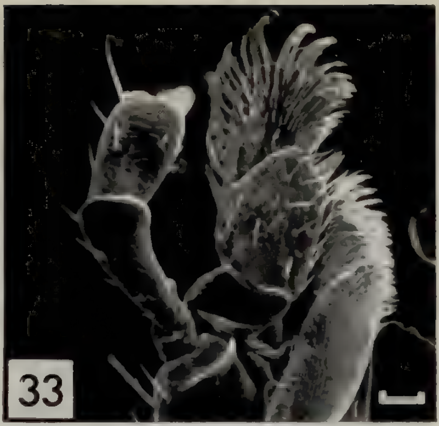
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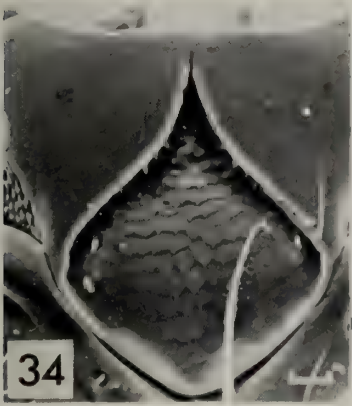
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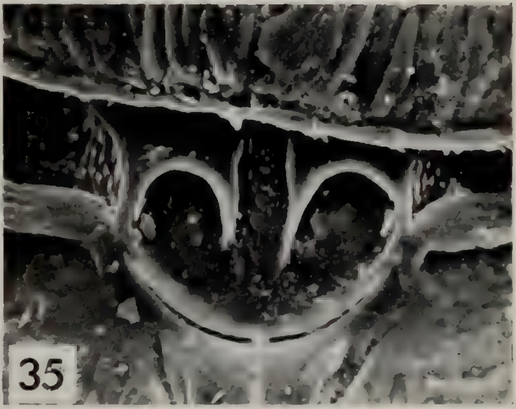
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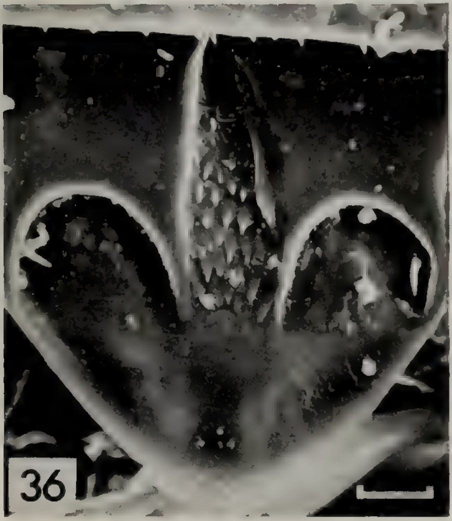
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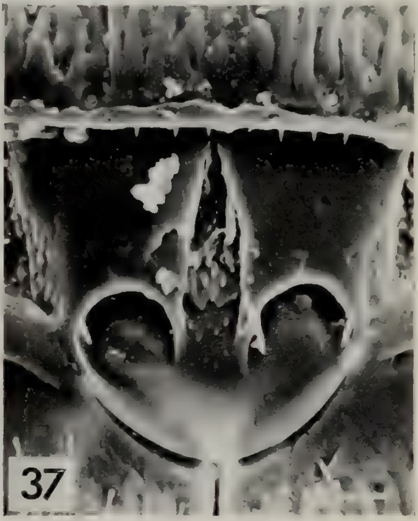
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A REVISION OF THE THEREVINE STILETTO-FLIES (DIPTERA : THEREVIDAE) OF THE ETHIOPIAN REGION

L. LYNEBORG

BULLETIN OF
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ENTOMOLOGY Vol. 33 No. 3
LONDON : 1976

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BY

LEIF LYNEBORG
Universitetets Zoologiske Museum, Copenhagen

Pp. 189–346; 459 *Text-figures*

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A REVISION OF THE THEREVINE STILETTO-FLIES (DIPTERA : THEREVIDAE) OF THE ETHIOPIAN REGION

By L. LYNEBORG

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SYNOPSIS

A detailed revision is provided of the Therevinae of the Ethiopian Region, based on a study of about 830 specimens representing 64 species. Nine genera are recognized: *Schoutedenomyia* Kröber (10 species in tropical Africa, of which 6 are new), *Stenopomyia* gen. n. (13 species in Madagascar, of which 12 are new), *Stenosathe* gen. n. (2 species in Natal and Rhodesia, of which the Rhodesian species is new), *Irwiniella* gen. n. (15 species in continental Africa, Madagascar, Rodriguez I., Sokotra and Cape Verde Is.; 6 of the species are new), *Neophycus* Kröber (one species in Cameroun and Nigeria), *Neothereva* Kröber (2 species in Mauritania and South West Africa, of which the South West African species is new), *Pseudothereva* gen. n. (4 species in eastern and southern Africa, of which one is new), *Thereva* Latreille (14 species in continental Africa; 7 species and 2 subspecies are new) and *Caenophthalmus* Kröber (5 species in Cape Province, of which 4 are new). All existing types have been examined, 9 lectotypes are newly designated, and 11 new specific synonyms are established. A diagnostic key to the suprageneric and generic categories is presented, and a key to the species is given under each genus.

INTRODUCTION

THE Dipterous family Therevidae is greatly in need of revision in all zoogeographical regions. Inspired by the plans for a Catalogue of the Diptera of the Ethiopian

Region, the present author has started a revision of the Therevidae of that region, of which the first part, dealing with the *Xestomyza*-group, has recently been published (Lyneborg, 1972). A subfamily and a tribal division of the family will be proposed by Irwin & Lyneborg (in prep.), in a revision of the North American genera of Therevidae. The two subfamilies, the Phycinae and the Therevinae, are both represented in the Ethiopian region, and the present paper is a revision of the last-mentioned subfamily. Two tribes of Phycinae are represented in the Ethiopian region: one of these is formed by the above-mentioned *Xestomyza*-group, which will be formally termed the Xestomyzini; the second tribe is the Phycini, which will be revised later.

The aim of any taxonomist must be to recognize and define the internal phylogenetic hierarchy within the group under treatment. In a family like the Therevidae, which is of great antiquity and has a world-wide distribution with several widely-separated centres of speciation, success in achieving this aim is largely dependent on the degree of certainty with which the supraspecific groups are established as monophyletic unities. In the paper by Irwin & Lyneborg (in prep.), the authors have attempted to arrange the North American species of Therevidae into clearly monophyletic groups, based on synapomorphic characters, and have given these groups generic rank. This has resulted in the erection of a dozen or more new genera, but there was no possibility of avoiding this if a strictly binomial nomenclature was to be retained. Future revision of Therevid fauna of other regions will undoubtedly result in the erection of a large number of further new genera.

In the present paper the author has followed the same aims, that is to say, to establish truly monophyletic genera. The only exception is the genus *Thereva*, which is certainly polyphyletic, as the *analis*- and *turneri*-groups are probably of different origin from the *seminitida*-group. However, the problems concerning the status of *Thereva* can best be elucidated in a revision of the Palaearctic fauna.

A total of about 830 specimens has been examined. The material has been accumulated from a large number of museums and also from some private collections. The depository of all specimens is given in abbreviated form after each record. The abbreviations used are as follows.

AMNH	American Museum of Natural History, New York, U.S.A.
BMNH	British Museum (Natural History), London, England.
CAS	California Academy of Sciences, San Francisco, U.S.A.
CM	University Museum of Zoology, Cambridge, England.
CNC	Canadian National Collection, Ottawa, Canada.
DJG	Collection of D. J. Greathead, Welwyn Garden City, Hertfordshire, England.
DM	Durban Museum, Durban, South Africa.
IFAN	Institut Fondamental d'Afrique Noire, Dakar, Senegal.
IPNB	Institut des Parcs Nationaux, Brussels, Belgium.
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium.
MB	Hungarian National Museum, Budapest, Hungary.
MCM	Museo Civico di Storia Naturale, Milan, Italy.
MCT	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
MEI	Collection of Michael E. Irwin, Urbana, Illinois, U.S.A.

MP	Muséum National d'Histoire Naturelle, Paris, France.
NM	Natal Museum, Pietermaritzburg, South Africa.
NMB	Naturhistorisches Museum, Basle, Switzerland.
NMW	Naturhistorisches Museum, Vienna, Austria.
NRS	Naturhistoriska Riksmuseum, Stockholm, Sweden.
SAM	South African Museum, Cape Town, South Africa.
SMF	Senckenberg Museum, Frankfurt, Germany.
SMNS	Staatliches Museum für Naturkunde in Stuttgart, Ludwigsburg, Germany.
TM	Transvaal Museum, Pretoria, South Africa.
USNM	United States National Museum, Washington, D.C., U.S.A.
WM	State Museum, Windhoek, S.W. Africa.
ZIH	Zoologisches Institut, Halle (Saale), Germany.
ZIL	Universitetets Zoologiska Institution, Lund, Sweden.
ZMB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany.
ZMC	Universitetets Zoologiske Museum, Copenhagen, Denmark.
ZMH	Zoological Museum, Helsinki, Finland.
ZSM	Zoologisches Sammlung des Bayerischen Staates, Munich, Germany.

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CLASSIFICATION AND PHYLOGENY

Until now the family Therevidae has had no internal hierarchy, and the characters used for separating genera were highly convergent and produced an unnatural classification containing many polyphyletic taxa at the generic level. Obvious examples are genera like *Thereva* and *Psilocephala* Zetterstedt, to which a large number of species from all zoogeographical regions had been assigned. Irwin & Lyneborg (in prep.) have presented a monophyletic classification of the North

American genera of Therevidae and have also defined two subfamilies, the Phycinae and the Therevinae. From among the results obtained, it is worth mentioning that *Thereva* in a monophyletic sense is restricted to the Nearctic and Palaearctic regions, with a few species in the Ethiopian and Oriental regions, while *Psilocephala* in a monophyletic sense is restricted to two boreal species, one in North America and one in North Europe. The subfamily Therevinae is so large and complex that a tribal division has been delayed until more information about the composition of the fauna in other regions, especially the Australian region, can be obtained and evaluated.

Compared with the North American fauna of Therevinae, the Ethiopian Therevinae are a much more uniform group. The Ethiopian Therevinae contain no genera with ventrally fused male gonocoxites, or with a more or less strongly sclerotized dorsal bridge between aedeagus and basal part of dorsal gonocoxal process, or with a reduced distal end of dorsal gonocoxal process. These three characters of the male terminalia are obvious apomorphic characters.

This indicates that the therevine genera of the Ethiopian region are related to that group of genera having more plesiomorphic characters in the male terminalia, which is represented by many genera in the Palaearctic region as well as in the Nearctic and Neotropical regions. However, with present knowledge it is impossible to recognize any sister-group relationships between genera or groups of genera in the Ethiopian region and genera or groups of genera in other regions.

The phylogenetic relationships between the Ethiopian genera of Therevinae are discussed in detail under each genus, and the reader is referred to the remarks after each generic description.

DISTRIBUTION

The distribution of the therevine genera of the Ethiopian region can be briefly summarized as follows. *Schoutedenomyia* seems to be restricted to the tropical parts of continental Africa. It is represented by ten species, and ranges from Nigeria and Kenya in the north through the Congo basin to Mozambique and Botswana in the south. All known species seem to occur at inland localities; none shows any association with coastal beaches. *Stenopomyia* is endemic to Madagascar and is represented there by 13 species. At least some of these are associated with biotopes near sea-coasts, but more exact information is needed. Apparently *Stenopomyia* does not occur in the Oriental region. The sister-group of *Stenopomyia* may be the small genus *Stenosathe*, represented by two species in Natal and Rhodesia.

Irwiniella is by far the most widely distributed genus in the Ethiopian region, and is also well-represented in the Oriental region. Fifteen Ethiopian species have been placed in this genus. Two species are found on the Cape Verde Is., two on Rodriguez I. east of Mauritius, three on Madagascar, and the rest occur on continental Africa. Most species of *Irwiniella* appear to be associated with coastal beaches, but some are also found at inland localities. The monobasic genus *Neophycus* is known only from Cameroun and Nigeria and is probably restricted to tropical Africa.

Neothereva is one of those genera overlapping the Ethiopian and Palaearctic regions, as it is represented by several species in and around the Saharan area. One species of *Neothereva* occurs in South West Africa.

Pseudothereva has a disjunct distribution, as three species occur in the highlands of Ethiopia and Kenya, while the fourth species, *parviseta*, is known only from the province of Pondoland in Natal, South Africa.

Thereva is restricted to the continental part of the region. As mentioned above, the Ethiopian species of this genus fall in three distinct groups, of which the *analis*- and *turneri*-groups will probably prove to be distinct genera eventually. The third group, the *seminitida*-group, represents *Thereva* in its most restricted sense. This group is closely related to the Holarctic stock of *Thereva*-species, and has an afroalpine distribution in Africa with one exception, *capensis*, which occurs in the Cape area. The *analis*-group is distributed from Kenya and Zaire in the north to Cape province in the south, while the *turneri*-group, represented by three species, is restricted to Cape province.

Caenophthalmus is a small genus of five species endemic to Cape province.

MORPHOLOGY

HEAD. Compound eyes of males touching or almost touching for a longer or shorter distance (Text-figs 1, 71, 183), but rather widely separated in some species of *Stenopomyia* (Text-figs 69, 73) and in some *Neothereva*. Facets of almost equal size, or upper facets distinctly enlarged. Female frons of very varying width: narrow in some species of *Stenopomyia* (Text-figs 68, 70), moderately wide in *Schoutedenomyia* (Text-figs 2, 3, 5, 7, 9, 11) and *Irwiniella* (Text-figs 184–188), very wide in *Thereva* (Text-figs 351, 352, 357, 358, 361–364) and in *Neothereva* (Text-figs 320, 321). The width of the frons largely depends on the degree to which the eye-margins diverge from upper frons down to antennal level. The frons (frontal triangle) of holoptic males may be more or less shining, as in some species of *Schoutedenomyia* (Text-fig. 1) and *Stenopomyia*, or may be entirely tomentose, in which case it is often darker tomentose on upper part than on lower part. Male frons bare in *Schoutedenomyia*, *Stenopomyia* and in some species of *Stenosathe* and *Irwiniella*, haired in the rest. Female frons with a very varying pattern, often consisting of areas of differently coloured tomentum, but also including non-tomentose shining areas that form calli in species of *Thereva* (Text-figs 362–364) or cover most of frons in *Schoutedenomyia* (Text-figs 2, 3) and *Pseudothereva* (Text-figs 330–332). The female frons usually has a greater or smaller number of hairs, and is only entirely bare in *Schoutedenomyia*.

In anterior view the heads show conspicuous intergeneric differences in the degree of divergence of the eye-margins from antennal level down to lower corner of eyes. A term, the facial index, has been introduced for the ratio between the distance across the face from lower eye-corner to lower eye-corner and the total height of the head. The lowest facial indices are found in *Stenopomyia*, where they vary between 0·32 and 0·47 (cf. Text-figs 2, 3, 5, 7, 9, 11) while the highest indices (over 1·00) occur in *Thereva* (Text-figs 361–364). *Irwiniella*, *Stenosathe* and *Pseudothereva* have values between these extremes, but there is only slight overlapping (see the generic descriptions). The lateral area of the face is bare or haired, and this character is usually a good generic character. However, it breaks down in *Irwiniella*, where *semiargentea* has hairs on the face whilst a closely related species, *lindbergi*, has a bare face. The genae are very narrow and hardly visible in lateral view in *Stenopomyia* (Text-figs 72, 74), whereas in genera like *Schoutedenomyia* (Text-figs 4, 6, 8, 10, 12) and *Irwiniella* (Text-figs 183–188) they are more variable in shape, either narrow and ridge-shaped or wider and more evenly curved. In *Pseudothereva* (Text-figs 330–332) and *Thereva* (Text-figs 351, 357, 364) the genae are very wide, corresponding to the more strongly diverging facial margins. The pubescence of the genae also shows variation.

The morphology of the proboscis has not been studied. There is not much variation in its external shape in the genera under treatment. However, in some species of *Thereva*, there is a tendency towards a reduction of the proboscis, and in *Caenophthalmus* the proboscis is distinctly longer and more slender than usual in the Therevinae, where the labellae are normally broad and large. The palpus is haired, and one-segmented and vermiform in most genera; only in *Schoutedenomyia* (Text-fig. 19) does an obvious two-segmented palpus occur, but the segmentation has not been studied in detail in most species (dissection necessary, but material sparse).

The occiput is always clearly seen in lateral view. It bears longer or shorter soft pubescence, and additional stronger bristles. The bristles forming a row along the upper post-ocular margin are termed the post-ocular setae. Below these there is usually a number of more irregularly arranged occipital setae. However, it is not always easy to separate these two groups of setae. The number of setae varies greatly in some genera, and often there are differences between the sexes.

The antennae play an important rôle in the taxonomy of the Therevinae, and are illustrated for almost all the species included in the present revision. The antennae are always slender in the genera under consideration. Three antennal segments, third segment with a two-segmented style that terminates in a tiny spine. Third antennal segment in *Caenophthalmus* (Text-fig. 440) with a secondary basal constriction. Ratio of first and third antennal segments very different, with extremes in *Schoutedenomyia longeantennata* (Text-fig. 12) and in *Neophycus*. Antennal segment 1 with hairs of varying lengths. Segment 2 with a ring of short hairs, and segment 3 often with some hairs near base. Ratio of style to third segment proper strongly variable and of generic importance. The ratio of the various sections of the style also shows considerable variation.

THORAX. Notopleural setae, three or more pairs. Supraalar setae, one or two pairs. Postalar setae, one pair. Dorsocentral setae absent or, if present, one to two pairs. Scutellar setae, one or two pairs, but not always constant. Mesonotum with a variable pattern consisting of tomentose and more shining areas. Mesonotal pile variable in length. Pleura more or less pilose, and the occurrence of pile on sternopleura particularly important for the separation of genera. Prosternum with pile on whole surface, or bare on the central area as in *Schoutedenomyia*, *Stenopomyia* and *Stenosathe pilosa*.

WINGS. Vein R_1 always bare. Cell R_4 showing considerable diversity in shape. *Stenopomyia* (Text-figs 87, 88) and some *Schoutedenomyia* (Text-fig. 26) with a long and narrow cell R_4, *Irwiniella* with the cell moderately wide, and *Thereva* with cell R_4 very wide towards apex. Cell M_3 may be open, closed at wing-margin or petiolate. Wing-colour hyaline, often with a greyish or brownish tinge, sometimes more whitish as in *Neothereva*, very rarely with a pattern of indistinct bands, but veins often partly surrounded by darker infuscations.

LEGS. Relatively long and slender, the hind legs longer than the others, in some *Schoutedenomyia* the fore legs (tibia and metatarsus) slightly incrassate (Text-fig. 23). Anterior coxae with one to several setae on anterior surface in addition to the normal pile. Anterior and mid coxae bare on posterior surface in *Schoutedenomyia*, *Stenopomyia* and *Stenosathe*, with long pile on posterior surface in the other genera. Femora often with one to several anteroventral setae; these setae short in the three genera just mentioned, longer in the others. Tibia 1 always without anteroventral setae; the setae in anterodorsal, posterodorsal and posteroventral position usually well-developed and longer than tibial diameter, only shorter than tibial diameter in *Schoutedenomyia* (Text-figs 20–23). Tibia 2 and 3 with setae in all four positions, but posteroventral setae of tibia 3 often more or less reduced.

ABDOMEN. Always 8 well-developed pregenital segments. Shape of abdomen rather narrow and parallel-sided in *Schoutedenomyia* (Text-figs 27, 25) and *Stenopomyia*, broader and more tapering in *Irwiniella* and especially in *Thereva*. Abdomen often entirely tomentose in males or with a pattern of darker bands on the first segments. Female abdomen usually with a pattern formed by shining bands and tomentose areas. Abdominal pile of very variable lengths.

MALE TERMINALIA. Ground-plan relatively uniform in all Ethiopian Therevinae. Last pregenital segment (segment 8) formed by tergite 8, which is strongly constricted at middle, and a less modified sternite 8. Both sclerites are illustrated for most species. Epandrium enclosing the rest of the genitalia and always dorsal in position. Shape of epandrium very variable, as the posterior margin is often modified, especially in *Stenopomyia*. In this incision on the posterior margin of the epandrium are situated the paired cerci, and ventrally under these is the so-called paraproct. This continues anteriorly into an intersegmental membrane which is situated close beneath the epandrium and is more or less distinctly attached to the anterior margin of the aedeagus (= the distal edge of the dorsal apodeme). The intersegmental membrane may be completely membraneous, or with a median sclerotisation, or with lateral sclerotisations as in strict *Thereva*. Gonocoxites always free ventrally in all Ethiopian Therevinae. Hypandrium present, but very reduced, and placed anteriorly between the bases of the gonocoxites. Gonocoxites bearing a dorsal gonocoxal process along their dorsal edge. The dorsal gonocoxal process has a long free distal extension in all Ethiopian Therevinae; however, it is short but distinct in some species of *Schoutedenomyia* (Text-fig. 32). The basal portion of the dorsal gonocoxal process is never attached to the aedeagus by a sclerotized bridge. Ventral margin of gonocoxite with an extension, the ventral lobe, which varies in shape. The gonocoxite also bears a stylus, a flexible rod inserted into its lumen. Aedeagus always free in Ethiopian Therevinae and consisting of a longer or shorter phallus, which may be more or less curved; a dorsal apodeme and a ventral apodeme of variable shape (dorsal apodeme reduced in *Stenopomyia distincta*); and, inserted between these, an ejaculatory apodeme shaped like a rod.

FEMALE TERMINALIA. These have not been studied in detail, but externally are very uniform. Tergite 10 (acanthophorites) strongly spinose; spines of two distinct types: those more distal in position are stout and project mostly dorsad and laterad, those more basal in position are slimmer and project ventrad and laterad.

DIAGNOSTIC KEY TO THE SUBFAMILIES,[*] AND TO THE GENERA OF THE SUBFAMILY THEREVINAE, OF THE ETHIOPIAN REGION

1 Dorsal sclerotized bridge present between dorsal apodeme of aedeagus and basal end of dorsal gonocoxal process; or if absent (Tribe Xestomyzini), then hypandrium very large and haired, and dorsal apodeme of aedeagus reduced. Ventral apodeme of aedeagus deeply forked. Tergite 10 of female weakly spinose, the spines of only one kind. Hind femur without hairs, or the hairs simple and unmodified. Vein R_1 often setulose . . . . **PHYCINAE**

– Aedeagus free, no dorsal sclerotized bridge between dorsal apodeme of aedeagus and basal end of dorsal gonocoxal process; or if dorsal apodeme absent (*Stenopomyia distincta*), or narrow and rod-shaped (*Stenosathe*), then hypandrium very reduced and without hairs. Ventral apodeme of aedeagus not forked, at most slightly incised distally. Tergite 10 of female strongly spinose, the spines of two distinct kinds: those more distal in position stouter, shorter, projecting mostly dorsad and laterad, those more basal in position slimmer, longer, projecting ventrad and laterad. Hind femur with scale-like to feathery hairs. Vein R_1 not setulose **(THEREVINAE)** 2

2 Coxae 1 and 2 bare on posterior surface. Sternopleuron bare, or short-haired on dorsal part only (in ♂ of *Stenosathe*). Prosternum only haired on lateral parts (haired over whole surface in *Stenosathe brachycera*). Femoral setae short. Aedeagus usually comparatively long and narrow in dorsal view. 1 or 2 supraalar setae on each side. 2 to 4 scutellar setae 3

– Coxae 1 and 2 haired on posterior surface. Sternopleuron long-haired over most of its surface, even on the anterior and ventral parts. Prosternum long-haired over whole surface. Femoral setae longer. Aedeagus comparatively short and broad in dorsal view. 2 supraalar setae on each side. Always 4 scutellar setae . . 5

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[*] The diagnostic characters used for separating the two subfamilies only apply to the Ethiopian members of the family.

3 Tibial setae shorter, most of the setae on tibia 1 distinctly shorter than tibial diameter (Text-figs 20–23). Antennal style short, about 20–25 per cent of length of third antennal segment (Text-figs 13–18). Palpus obviously two-segmented, apical segment often wider than basal segment (Text-fig. 19). Epandrium simple or with slight modifications. Tip of stylus thick and hook-shaped. Cell M_3 usually petiolate. Frons totally bare . . ***SCHOUTEDENOMYIA*** (p. 199)

– Tibial setae longer, most of the setae on tibia 1 longer than tibial diameter. Antennal style long, usually about 40–50 per cent of length of third antennal segment (Text-figs 75-86, 166). Palpus one-segmented and uniformly vermiform. Epandrium often with strong modifications in shape (cf. Text-figs 104, 163). Tip of stylus slender and only slightly curved (cf. Text-figs 103, 160). Cell M_3 usually broadly open (Text-figs 87, 88). Male frons bare or haired; female frons usually with short black hairs. 4

4 Upper eye-facets of male not distinctly enlarged. Facial margins only slightly diverging below: distance between lower eye corners equal to less than half height of head (Text-figs 1–3, 5, 7, 9, 11). Frons of female, and of dichoptic males, with a pattern of blackish, brownish or greyish tomentum, sometimes also slightly shining below. Epandrium usually with strong modifications in shape (cf. Text-figs 104, 163). Aedeagus in dorsal view with dorsal apodeme at least slightly wider than proximal part of phallus (cf. Text-figs 106, 162) ***STENOPOMYIA*** (p. 219)

– Upper eye-facets of male distinctly enlarged. Facial margins more diverging below: distance between lower eye-corners equal to half or more height of head (Text-fig. 168). Frons of female entirely tomentose with brownish and greyish colours, but not forming any distinct pattern (Text-fig. 168). Epandrium simple (Text-figs 173, 180). Aedeagus in dorsal view with dorsal apodeme narrower than proximal part of phallus (Text-figs 172, 179) . . . . . ***STENOSATHE*** (p. 246)

5 Male eyes nearly touching or separated by a distance 2–4 times as wide as anterior ocellus. Female frons very wide and with two large, circular dull blackish areas (Text-figs 320, 321). Front coxae without setae anteriorly ***NEOTHEREVA*** (p. 291)

– Male eyes touching or separated by less than width of anterior ocellus. Female frons narrower; if with large, circular blackish areas, these are shining. Front coxae with a few setae anteriorly 6

6 Third antennal segment (Text-fig. 440) with a very distinct constriction basally; antennae thus appearing 4-segmented, exclusive of style. Female eyes (Text-fig. 440) strongly reduced, very narrow in lateral view . ***CAENOPHTHALMUS*** (p. 334)

– Third antennal segment without a distinct constriction basally; antennae always appearing 3-segmented, exclusive of style. Female eyes normal . . . 7

7 Facial margin moderately diverging below: the distance between lower eye-corners equal to 47–87 per cent of height of head. Face bare (only haired in *Irwiniella semiargentea*). Female frons never with subshining to shining areas . . . 8

– Facial margins more diverging below: the distance between lower eye-corners equal to 84–127 per cent of height of head. Face with hairs on lateral areas. Female frons often with subshining to shining areas 9

8 First and third antennal segments (Text-figs 189–203) at most about 5 times as long as wide . . . . ***IRWINIELLA*** (p. 251)

– Both first and third antennal segments 10–12 times as long as wide ***NEOPHYCUS*** (p. 288)

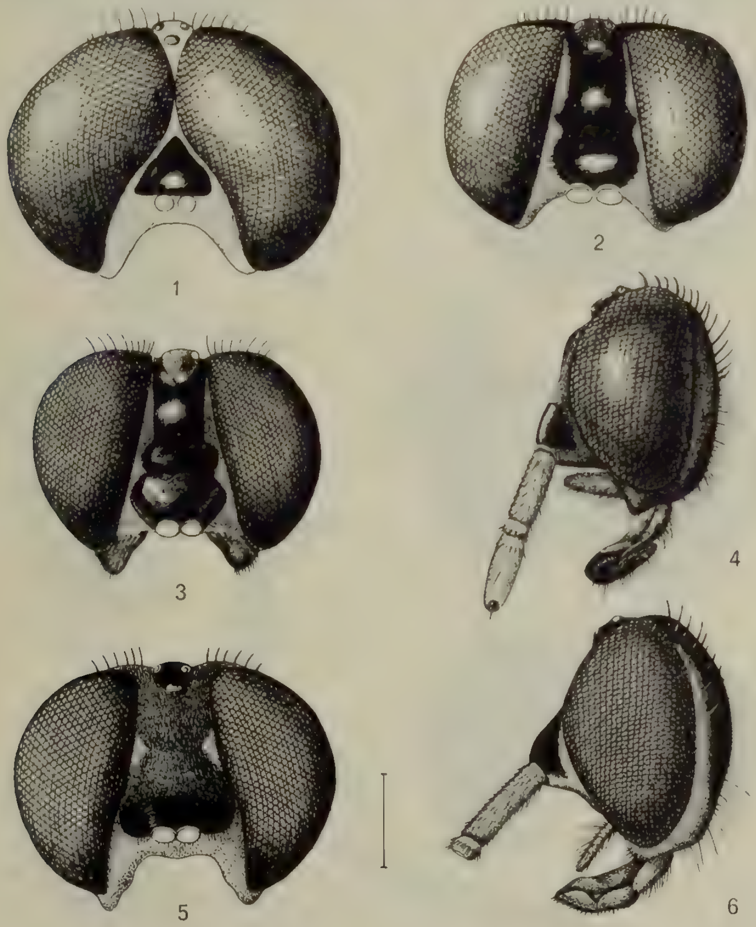
9 Distance between lower eye-corners equal to 84–98 per cent of height of head (Text-figs 330–332). Female frons shining on most of its area, at least not partly tomentose on the upper part . . . . ***PSEUDOTHEREVA*** (p. 295)

– Distance between lower eye-corners usually exceeding height of head (Text-figs 351, 357, 364). Female frons at least partly tomentose on the upper part ***THEREVA*** (p. 303)

SCHOUTEDENOMYIA Kröber

Schoutedenomyia Kröber, 1936 : 256. Type-species: *Schoutedenomyia congoensis* Kröber, by monotypy.

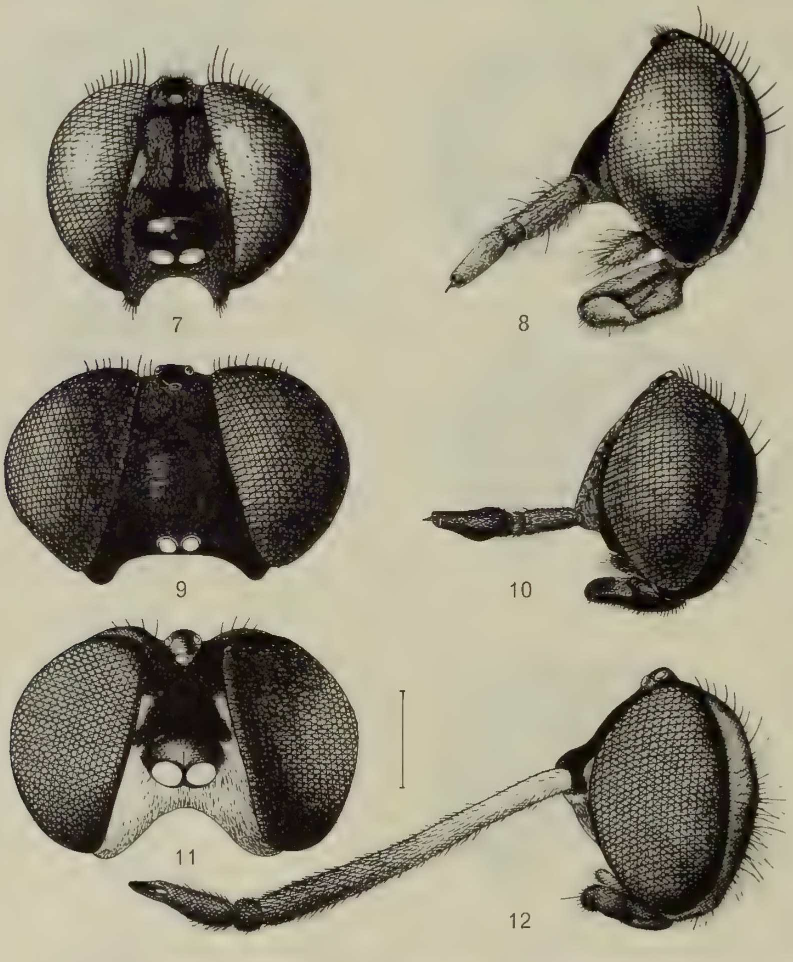
DESCRIPTION. *Head.* Male eyes touching, or nearly touching, for rather a short distance (Text-fig. 1). Upper facets of male eyes distinctly larger than lower facets, often with a rather sharp line of demarcation between the larger and smaller facets, as shown in Text-fig. 1. Male frons triangular, in some species with a shining blackish callus, in other species entirely tomentose. Female frons (Text-figs 2, 3, 5, 7, 9, 11) broad, gradually increasing in width below; colour mostly blackish and shining, but small and narrow areas of greyish tomentum may occur along the eye-margins. Female frons not plain, as upper and lower parts are more raised than central part. Face short and slightly widening below. Facial indices varying between 0·47 and 0·68. Proboscis short, reaching at most to level of middle of first antennal segment, in most species not reaching to level of antennal bases. Labella of proboscis broad. Palpi



FIGS 1–6. Heads of *Schoutedenomyia*. 1, *S. antennata*, ♂ holotype in frontal view; 2, *S. samaruensis*, ♀ in frontal view; 3, *S. congoensis*, ♀ holotype in frontal view; 4, same in lateral view; 5, *S. signata*, ♀ holotype in frontal view; 6, same in lateral view. Scale: 0·5 mm.

shorter than proboscis, obviously two-segmented (Text-fig. 19), although segmentation is often difficult to discern without dissection. Apical segment of palpi often distinctly wider than basal segment (Text-fig. 19). Frons and face always entirely bare, while genae may have some hairs. Lower part of occiput with a moderately long whitish pile. Upper part of occiput with the post-ocular and occipital setae rather long, especially in the male, forming a continuous row. Antennae always simple. First and third antennal segments of almost equal width, their relative lengths showing interspecific differences (Text-figs 4, 6, 8, 10, 11, 13–18). Antennal style short, its length about 20–25 per cent of the length of third segment. It is often more or less distinctly inserted into a groove in the third segment, and has a subapical position in *longeantennata*. Style consisting of two segments of almost equal length and an apical spine. The style may be conical or more parallel-sided.

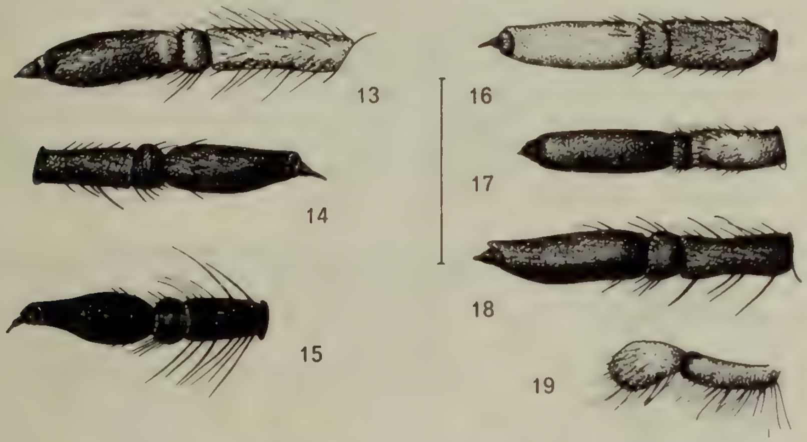
Thorax. Three notopleural, 1–2 supraalar, one postalar setae. Dorsocentral setae never present. Two or four scutellar setae, if four, then the lateral pair shorter than the apical pair. Ground colour blackish, mesonotum more or less dulled by greyish and brownish tomentum, which may form indistinct stripes. Prosternum with short whitish pile only on lateral areas.

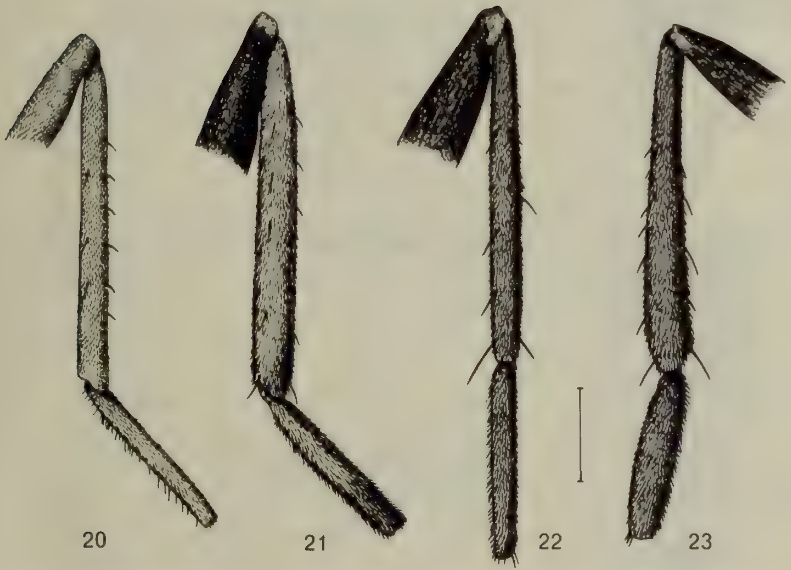


Figs 7–12. Heads of *Schoutedenomyia*. 7, *S. lindneri*, ♀ holotype in frontal view; 8, same in lateral view; 9, *S. leclercqi*, ♀ holotype in frontal view; 10, same in lateral view; 11, *S. longeantennata*, ♀ holotype in frontal view; 12, same in lateral view. Scale: 0·5 mm.

Mesopleuron, especially the upper part, and metapleural callosity with whitish pile. Other pleural sclerites, including the whole sternopleuron, completely free of pile. Pleura more or less tomentose.

Wings (Text-figs 26–29). Cell R_4 shows considerable diversity in shape. In the type-species (Text-fig. 26) it is remarkably long and slender, i.e. about four times as long as wide at wing-margin. Other species have cell R_4 distinctly shorter and wider. At the same time vein R_4 also has a variable curvature. It is evenly S-curved in species with a wide cell R_4, but often





FIGS 13–19. *Schoutedenomyia.* 13–18, antennae; 19, palpus. 13, *S. antennata*, ♂ holotype; 14, *S. langi*, ♂ holotype; 15, *S. macroptera*, ♂ holotype; 16, *S. samaruensis*, ♀; 17, same, ♂ holotype; 18, *S. kroeberi*, ♂ holotype; 19, *S. samaruensis*, ♀. Scale: 0·5 mm.

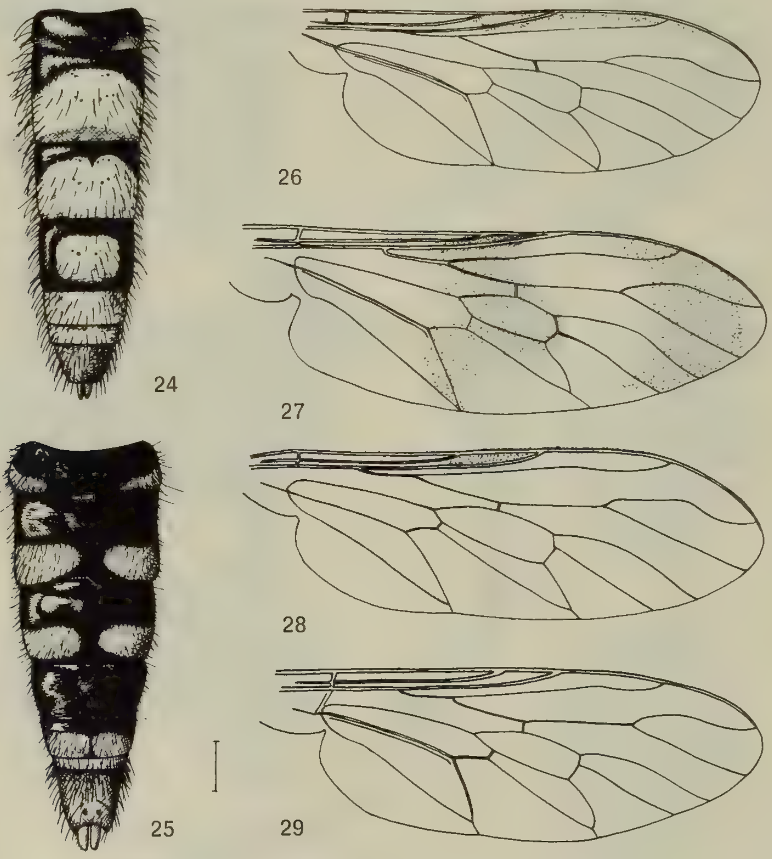
FIGS 20–23. Front legs of *Schoutedenomyia*, posterior view. 20, *S. congoensis*, ♀ holotype; 21, *S. signata*, ♀ holotype; 22, *S. lindneri*, ♀ holotype; 23, *S. leclercqi*, ♀ holotype. Scale: 0·5 mm.

has the proximal part straighter in species with a narrower cell R_4 (Text-figs 26, 28). Cell M_3 may be open, but is usually petiolate; this character certainly shows infra-specific variation. Wing-colour nearly always uniformly hyaline with a more or less intense greyish brown tinge, with dark stigma and veins. Only one species, *signata*, has an indistinctly banded wing (Text-fig. 27).

Legs (Text-figs 20–23). Coxae without pile on posterior surfaces. *Av* setae always present on f_3, less constantly on f_1, and rarely on f_2. F_3 may have a few short additional *pv* setae. Front tibiae with some *ad*, *pd* and *pv* setae, all of which are comparatively short, i.e. most of them always distinctly shorter than width of t_1. T_2 and t_3 with rows of short *ad*, *pd*, *av* and *pv* setae, all being comparatively short. T_1 and its metatarsus are normal in most species, only distinctly thickened in *leclercqi* (Text-fig. 23). Claws and pulvilli normal.

Abdomen (Text-figs 24, 25). In most species the male abdomen is narrow and parallel-sided (Text-fig. 24), and is either entirely tomentose or has a pattern of tomentose and shining areas. One species, *samaruensis* (Text-fig. 25), has a differently shaped abdomen which is more gradually tapering as in the female sex. The abdominal pile is comparatively short.

Male terminalia. The epandrium is slightly variable in shape. In particular, the posterior margin shows tendencies towards the formation of dentate projections on lateral corners. The



FIGS 24–29. *Schoutedenomyia.* 24, 25, abdomens in dorsal view; 26–29, wings. 24, *S. antennata*, ♂ holotype; 25, *S. samaruensis*, ♂ holotype; 26, *S. congoensis*, ♀ holotype; 27, *S. signata*, ♀ holotype; 28, *S. lindneri*, ♀ holotype; 29, *S. leclercqi*, ♀ holotype. Scale: 0·5 mm.

cerci are also variable in shape and are conspicuously enlarged in two species (Text-figs 31, 39). Paraproct shaped as a small plate; sclerotizations of the intersegmental membrane never present. Posterior margin of gonocoxite of very variable shape, abruptly truncate in *langi* (Text-fig. 46) or extended into a shorter and longer projection which reaches its maximal length on *kroeberi* (Text-fig. 55). The distal end of dorsal gonocoxal process is also very variable in length but this does not seem to be correlated with a more or less pronounced projection on the posterior margin of the gonocoxite, though in most species the two structures reach to almost the same level. The shape of stylus is characteristic in the genus. Its structure is comparatively strong, with the ventral margin more or less suddenly curved and forming a distinct hook apically. This hook is accentuated by a deep indentation in the dorsal margin of the stylus. The ventral lobe is a long, irregularly shaped structure and is shorter than the stylus. The hypandrium is always present and free, comparatively large in *kroeberi* (Text-fig. 58) and here with a few setae; in the other species (Text-fig. 34) it is smaller and without hairs. The aedeagus is free, and is basically very long and slender in shape. The phallic part in most species consists of a slender, undulating tube, while the dorsal, ventral and ejaculatory apodemes are completely uncomplicated in structure. Tergite 8 is very narrow medially. Sternite 8 is well-developed.

REMARKS. The genus *Schoutedenomyia* has not been mentioned in the literature since it was first described by Kröber (1936) for a new species, *congoensis*, founded on a single, badly preserved female specimen. Nine further species are placed in the genus in the present paper. Six of these are described as new, whilst the three others were originally described in *Psilocephala*. The ten species are represented in all by only 20 specimens. This is, of course, an unsatisfactory basis for a sound taxonomic treatment of the genus. Only one species, *samaruensis*, is represented by what is presumed to be male and female of the same species. Two female specimens are at hand of the type-species, *congoensis*, four male specimens are known of *antennata* and two of *macroptera*. Two species, *langi* and *kroeberi*, are known only from the male holotypes, while four other species, *signata*, *lindneri*, *leclercqi* and *longeantennata* are only known from the female holotypes.

The genus seems to be widespread in tropical Africa, from Nigeria and Kenya in the north to Mozambique and Rhodesia in the south, and may have its centre of distribution in Zaire. The species seem to be collected only rarely. Little can be said about the habitats, but the species seem to be associated with riverbanks and lake shores. They do not show any association with coastal beaches.

The species of *Schoutedenomyia* bear a close superficial similarity to the New World species of *Furcifera*, a genus erected by Kröber (1911 : 524) for three new species, *polita*, *fascipennis* and *longicornis*, originating from South America and Mexico. The second of these species, *fascipennis*, was designated as the type-species by Cole (1960 : 161), who also synonymized *Epomyia* Cole (1923) with *Furcifera*. The antennae are of practically the same shape in *Schoutedenomyia* and *Furcifera*. They are rather slender, the segments being of almost equal width and having very short pile. The style is short and is placed on the truncate tip of the third segment, sometimes in a distinct groove which may be situated more or less subapically. The proboscis is short and has broad soft labella, whilst the palpi appear two-segmented, with the apical segment often distinctly wider than the basal segment. The males seem to be holoptic in both genera.

The female frons is distinctly broader in *Schoutedenomyia* than in *Furcifera*, and it is a characteristic difference that the ocellar plate in *Furcifera* occupies the entire width of the frons, whereas in *Schoutedenomyia* there is a space between the outer margin of the ocellar plate and the eye-margin (Text-figs 2, 3, 5, 7, 9, 11). There is also a fundamental difference in the pattern of frontal ornamentation between the two genera. The females of *Furcifera* have a large, velvet-black spot between the tomentum of the face and lower frons and the more shining black colour of the upper frons, this mark being specific in shape. In females of *Schoutedenomyia* the frons is basically black and shining, with only narrow areas of greyish tomentum laterally at eye-margins (Text-figs 2, 3, 5, 7, 9, 11). Males of *Furcifera* often have a small velvety-black area at extreme top of frons, while males of *Schoutedenomyia* have the frons either entirely pale tomentose or with a shining black area on lower part (Text-fig. 7).

The chaetotaxy of the thorax is not constant in either genus. The scutellar setae are present as 2 strong pairs in some species of both genera, or as only 1 pair (which may be weak or strong) in several species of *Schoutedenomyia* and in *F. scutellaris* (Loew), or may even be absent as in *F. achaeta* Malloch and *F. kroeberi* Cole, both South American species. The number of supraalar setae also varies. No dorsocentral setae are present in either genus. The distinctive pattern of mesonotum and scutellum found in the species of *Furcifera* is not found in the species of *Schoutedenomyia*. These have a banded and striped mesonotum as 'normal' in the Therevidae.

The wings do not show any structural differences between the two genera. The same is true of the legs. Front and hind femora may have a few short *av* setae. The tibial setae are weak, especially those setae forming the two dorsal rows on front tibia (Text-figs 20–23). Front tibia and metatarsus are more or less thickened in the species of *Furcifera*, but this is not the case in the species of *Schoutedenomyia*, except in one species, *leclercqi* (Text-fig. 23).

The male abdomen is cylindrical in both genera and the terminal segments show a tendency to be telescopically withdrawn into the rest of the abdomen. The abdomen has a pronounced pattern of tomentose and non-tomentose areas. In nearly all species of both genera the male terminalia are characteristically reddish yellow.

The male terminalia show some fundamental differences in the two genera. These differences may be of great importance for a future understanding of phylogenetic relationships for which reason they are discussed in detail here. The present author (Lyneborg, 1969) has previously described the male terminalia of a Mexican species of *Furcifera*, *sumichrasti* Bellardi. A further species, obviously undescribed and originating from S. Brazil, has also been dissected.

The epandrium is more highly specialized in *Furcifera* than in *Schoutedenomyia*, as the posterior corners are more or less projecting. In some species of *Schoutedenomyia* the cerci are enlarged and well sclerotized, whereas in *Furcifera* they are weakly sclerotized and of normal size, probably a compensation for the projecting posterior corners of epandrium. The gonocoxites have reached what is supposed to be a more advanced stage in *Furcifera* than in *Schoutedenomyia*. In *Furcifera* the gonocoxites are fused ventrally, forming together with the hypandrium a ventral synsclerite. *Schoutedenomyia* has free gonocoxites and a free hypandrium (Text-fig. 58).

Furthermore, the gonocoxites in *Furcifera* have a distinct tendency to form a proximal (anterior) and a distal (posterior) part. This tendency is very pronounced in *sumichrasti* (see Lyneborg, 1969: fig. 31); in other species the posterior part is more like a pointed projection. Similar projections occur in some species of *Schoutedenomyia*, but they are never so accentuated. The dorsal gonocoxal process, which is so prominent in *Schoutedenomyia*, is completely absent in *Furcifera*. This important detail is related to the fact that the aedeagus is quite free in *Schoutedenomyia*, whereas in *Furcifera* there is a well sclerotized narrow bridge from the aedeagus to the basal portion of the dorsal gonocoxal process. The stylus of *Schoutedenomyia* is rather complicated in shape with its hooked apex and median lobe; in *Furcifera* the stylus is more simple, but quite strong.

On this basis there is no doubt that *Furcifera* and *Schoutedenomyia* not only represent distinct genera but also belong to different suprageneric categories. *Furcifera* certainly represents more advanced Therevidae than does *Schoutedenomyia*, i.e. it possesses a larger number of apomorphic characters than does *Schoutedenomyia*.

As to possible relatives of *Furcifera*, attention should be directed to the Neotropical genus *Cyclotelus* Walker, 1850. The type-species is *pruinosus* Walker, 1850, according to a designation by Becker (1912 : 315). I have dissected the male holotype of *pruinosus*, which is in the British Museum (Natural History). The terminalia are basically identical with those of *Furcifera* as discussed above, and I think it likely that *Furcifera* will later have to be treated as a synonym of *Cyclotelus*. The Mexican species, '*Thereva*' *crassicornis* Bellardi, 1861, which was redescribed by the present author (Lyneborg, 1969 : 398), also belong to this group.

The reason why this astonishing superficial similarity between *Schoutedenomyia* and *Furcifera* has been discussed in such great detail is that the two genera seem to represent a fine example of parallelism. Their species certainly occupy the same ecological niches in tropical and subtropical environments in Africa and the New World, respectively. It is also worth mentioning that similar Therevid flies occur in North Australia (Queensland), but the phylogenetic relationships of these cannot be discussed at present due to lack of information.

The genus *Schoutedenomyia* has a somewhat isolated position among the Ethiopian genera of Therevinae. The obviously two-segmented palpus is a plesiomorphic character; all other genera treated in this paper have a one-segmented, vermiform palpus representing an apomorphic condition. Some synapomorphic characters for the genus can be listed as follows: frons totally bare, also in female; antennal style very shortened; cell M_3 usually petiolate; setae of tibia 1 reduced; stylus modified; and phallic part of aedeagus very elongate.

The genus seems rather heterogeneous in its specific content, but as the available material is very sparse, further discussion of the infra-generic relationships would be premature.

KEY TO SPECIES OF *SCHOUTEDENOMYIA*

1 Eyes touching on frons (males) 2

– Eyes broadly separated on frons (females) 6
2 Terminalia reddish yellow 3
– Terminalia blackish . . . . ***langi*** (p. 210)
3 Frons with a polished black callus (Text-fig. 1) 4
– Frons more or less intensely tomentose, never with a polished black callus . . 5
4 Femora yellowish. Halteres dark brownish. Abdomen as in Text-fig. 24 ***antennata*** (p. 206)
– Femora more or less darkened. Halteres whitish. Abdomen as in Text-fig. 25 ***samaruensis*** (p. 208)
5 Frons intensely whitish grey tomentose. Antennal pile long (Text-fig. 15). Two *sa* setae . . . . ***macroptera*** (p. 313)
– Frons less intensely tomentose, thus appearing subshining. Antennal pile short (Text-fig. 18). One *sa* seta . . . . ***kroeberi*** (p. 212)
6 Frons with a narrow, irregular stripe of greyish tomentum along entire eye-margin (Text-figs 2, 3) 7
– Frons without such a stripe of greyish tomentum along entire eye-margin (Text-figs 5, 7, 9, 11), at most with a small area of tomentum at middle (Text-figs 5, 7, 11) 8
7 First antennal segment shorter than third segment (Text-fig. 16). Cell R_4 only about 2·5 times as long as wide. Halteres whitish . . . ***samaruensis*** (p. 208)
– First antennal segment about as long as third segment (Text-fig. 4). Cell R_4 about 4 times as long as wide (Text-fig. 26). Halteres brownish . ***congoensis*** (p. 215)
8 First antennal segment (Text-fig. 12) nearly twice as long as length of head and thrice as long as third antennal segment . . . ***longeantennata*** (p. 218)
– First antennal segment (Text-figs 6, 8, 10) not as long as length of head, and first and third segments of almost equal length 9
9 Frons without areas of thick tomentum (Text-fig. 9), though there may be a very thin tomentum all over. Front tibia and tarsus thickened (Text-fig. 23) ***leclercqi*** (p. 217)
– Frons with a small area of tomentum at eye-margin near middle of frons (Text-figs 5, 7). Front tibia and tarsus more slender (Text-figs 21, 22) 10
10 Wing with two broad, indistinctly brownish bands (Text-fig. 27). First antennal segment long (Text-fig. 6) . . . . ***signata*** (p. 216)
– Wing without bands (Text-fig. 28). First antennal segment shorter (Text-fig. 8) ***lindneri*** (p. 216)

Schoutedenomyia antennata (Kröber) **comb. n.**

(Text-figs 1, 13, 24, 30–38)

Psilocephala antennata Kröber, 1939 : 396. Holotype ♂, RHODESIA (BMNH) [examined].

DIAGNOSIS. ♂. Frons with shining black callus (Text-fig. 1). Two *sa* and four *sc* setae. Halteres dark brownish. Cell M_3 petiolate. Femora all yellowish and not tomentose. Abdomen slender (Text-fig. 24). Terminalia reddish yellow. ♀. Unknown.

REDESCRIPTION. ♂. *Head* (Text-figs 1, 13). Facial index 0·60. Frons raised and predominantly shining blackish, only narrowly whitish grey tomentose along eye-margin. Face also whitish grey tomentose. Occiput shining blackish below, but greyish tomentose on an area along eye-margin that includes the short and narrow gena. Upper part of occiput dark greyish tomentose. About 18 long post-ocular and occipital setae on each side. Antennae yellowish brown, third segment darkened. All three segments with short black pile.

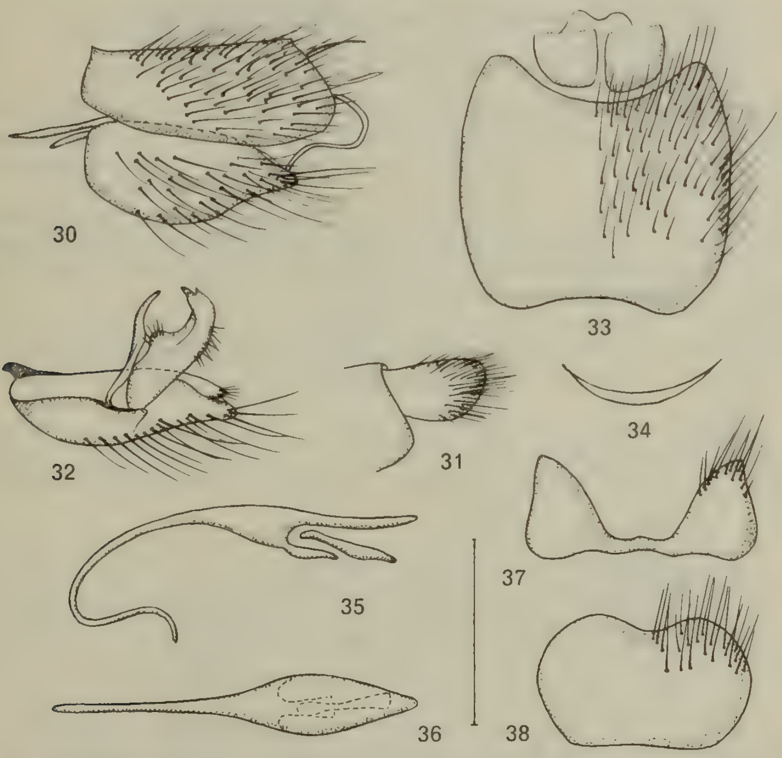
Thorax. Two *sa* setae, four short *sc* setae. Mesonotum black and subshining, with two indistinct, whitish tomentose stripes. Mesonotal pile long (0·25 mm) and whitish. Scutellum blackish, thinly greyish tomentose and with whitish pile. Pleura greyish tomentose, except on pteropleuron which is brownish black and more shining.

Wings. Cell M_3 long-petiolate. Cell R_4 about 2·5 times as long as wide. Vein R_4 rather broad and S-shaped. Colour hyaline, with a slight greyish brown tinge. Stigma and veins dark brownish. Halteres dark brownish.

Legs. F_1 and f_2 without setae. F_3 with 2–3 short *av* setae in apical half. Coxae greyish tomentose. Femora and tibiae yellowish to yellowish brown, tibiae darker than femora. Tarsi yellowish brown at bases, becoming dark brownish towards tips.

Abdomen (Text-fig. 24). Shape cylindrical, only narrowing a little towards the apex. In dorsal view tergites 2–6 appear predominantly silvery whitish grey tomentose. Tergites 2–3 are shining blackish on antero-lateral corners and on extreme anterior parts, while tergite 4 is shining blackish anteriorly, posteriorly and laterally, leaving a semi-rectangular central area whitish grey tomentose. In posterior view tergites 4–5 are entirely whitish grey tomentose. Lateral margins of tergites 2–3 and 5 are blackish on anterior half and whitish grey on posterior half, while tergite 4 is black for its entire length. Pile whitish on all tergites. Hind-marginal seams indistinct. Sternites in ventral view shining blackish brown; in lateral view, the postero-lateral parts of sternites 2–3 appear greyish tomentose. Pile whitish on these two sternites, while the following sternites have a blackish pile.

Terminalia (Text-figs 30–38). Entirely reddish yellow with black pile. Epandrium as in Text-fig. 33. Cerci (Text-fig. 31) distinctly enlarged, obviously broken in the holotype (Text-fig. 30). Posterior margin of gonocoxite (Text-fig. 30) with a moderately long pointed projection. Distal end of dorsal gonocoxal process comparatively short, not visible in lateral view (Text-fig. 30), but appearing in ventral view (Text-fig. 32). Stylus comparatively slender, with two



FIGS 30–38. Male terminalia of *Schoutedenomyia antennata*, holotype (except 31). 30, genitalia in lateral view; 31, cerci of an undamaged specimen; 32, right gonocoxite in intero-ventral view; 33, epandrium in dorsal view; 34, hypandrium; 35, aedeagus in lateral view; 36, aedeagus in dorsal view; 37, tergite 8; 38, sternite 8. Scale: 0·5 mm.

small teeth at the curved apex. Ventral lobe narrow and arising from a lamellate triangular process on ventral margin of gonocoxite, as a result of which a secondary articulation seems to appear. Hypandrium as in Text-fig. 34. Aedeagus greatly overhanging anterior and posterior margins of epandrium; its shape as shown in Text-fig. 35 and Text-fig. 36. Tergite 8: Text-fig. 37. Sternite 8: Text-fig. 38.

Total length about 7 mm.

♀. Unknown.

DISTRIBUTION. Kenya, Rhodesia, Botswana and S. W. Africa.

MATERIAL EXAMINED.

Holotype ♂, RHODESIA ('S. Rhodesia'): Bulawayo, 27.vii.1923 (BMNH); the specimen has lost its right antenna, right p_2, tarsi of right p_3 and left p_1 and p_3, and the abdomen has been detached and is glued to the thorax in an inverted position.

KENYA: Stony Athi, 1 ♂, vi.1940 (BMNH). BOTSWANA: Ootsi, 1 ♂, ix. 1973 (*J Reed*) (CNC). SOUTH WEST AFRICA: Papa Falls, Kavango, 18°07'E 27°33'S, 1 ♂ 26–31.viii.1971 (WM).

***Schoutedenomyia samaruensis* sp. n.**

(Text-figs 2, 16, 17, 19, 25, 39–45)

DIAGNOSIS. ♂. Frons with a shining black callus as in *antennata*. One *sa* and two *sc* setae. Halteres whitish. Cell M_3 petiolate. Femora more or less darkened, not entirely yellowish as in *antennata*, and abdomen with different pattern (cf. Text-figs 24 and 25). Terminalia reddish yellow.

♀. Frons with a tomentose stripe along entire eye-margin as in the type-species, *congoensis*. First antennal segment shorter than third (in *congoensis* of the same length). One *sa* and two *sc* setae. Wing unicolourous. Cell R_4 wide, only 2·5 times as long as wide, and cell M_3 long-petiolate. Halteres whitish. Front leg slender.

DESCRIPTION. ♂. *Head* (Text-fig. 17). Facial index 0·47. Practically as described for *antennata*, but lower part of occiput more densely tomentose, and genae and face narrower. Antennae shorter, more blackish, and antennal pile shorter. About 13 post-ocular and occipital setae.

Thorax. 1 *sa* seta, 2 short *sc* setae. Colour as in *antennata*, but mesonotum less shining blackish due to a denser covering of greyish tomentum. Pile shorter than in *antennata* and of the same colour as in this species. Scutellum more greyish tomentose than in *antennata*; the pile whitish.

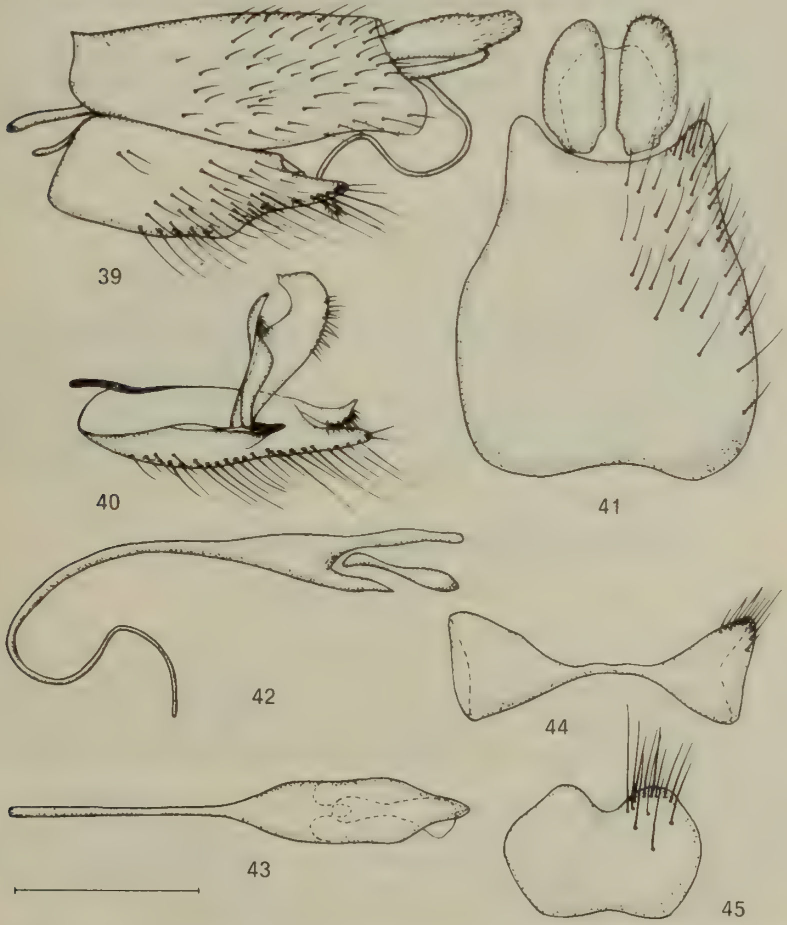
Wings. Cell R_4 2·6 times as long as wide. Proximal part of vein R_4 straighter than in *antennata*. Other structures and colour as in *antennata*. Halteres entirely whitish.

Legs. F_1 with a small *av* seta near middle. F_3 with 4 rather strong *av* setae in apical half. Coxae greyish black. F_1, f_2 and tibiae yellowish to yellowish brown, but the femora partly darkened: F_1 blackish brown on posterior surface of basal fourth and f_2 on basal half. F_3 predominantly blackish brown, only paler brownish on ventral surface of apical fourth. Tibiae yellowish brown. Tarsi yellowish brown at bases, becoming darker brownish towards tips.

Abdomen (Text-fig. 25). Shape more pointed than in *antennata*. The pattern on tergites 1–4 is different from that of *antennata*. Tergite 1 blackish dorsally, greyish postero-laterally. Tergites 2–3 with blackish anterior bands, which occupy about half the length of tergite 2 and less than half the length of tergite 3. The bands of both tergites are broadest on the mid-line, where they project towards posterior margins in the shape of a narrow triangle. Remainder of these tergites whitish grey tomentose. Tergite 4 entirely blackish. Pile mainly whitish, moderately long laterally and short dorsally. Sternites brownish black with thin greyish tomentum. Their pile of the same colour as in *antennata*.

Terminalia (Text-figs 39–45). Large and entirely reddish yellow; pile black. Epandrium (Text-fig. 41) longer than in *antennata*, its postero-lateral corners moderately long, but broadly rounded. Cerci (Text-fig. 39) strongly enlarged, well sclerotized and short-haired. Paraproct also large. Posterior margin of gonocoxite (Text-fig. 39) with a long pointed projection. Dorsal gonocoxal process with a short, free distal end which is visible in lateral view (Text-fig. 39) below the posterior gonocoxal projection. Stylus (Text-fig. 40) broader at apex than in *antennata* and with two small teeth. Ventral lobe as in *antennata*. Aedeagus greatly overhanging both anterior and posterior margins of epandrium. Phallus shaped as in *antennata*, but larger and more undulating (Text-figs 42, 43). Tergite 8: Text-fig. 44. Sternite 8: Text-fig. 45.

Total length 6·8 mm.



FIGS 39–45. Male terminalia of *Schoutedenomyia samaruensis*, holotype. 39, genitalia in lateral view; 40, right gonocoxite in intero-ventral view; 41, epandrium in dorsal view; 42, aedeagus in lateral view; 43, aedeagus in dorsal view; 44, tergite 8; 45, sternite 8. Scale: 0·5 mm.

♀. *Head* (Text-figs 2, 16). Facial index 0·52. Shape and pattern of frons as in Text-fig. 2. All parts of head whitish grey tomentose, except the shining black frontal band. Gena narrow. Palpus as in Text-fig. 19. Only 10 post-occular + occipital setae which are shorter than in male. Antennae (Text-fig. 16) slightly wider than in male (Text-fig. 17) and distinctly paler than in the holotype (? due to bleaching in alcohol). First antennal segment distinctly shorter than third (excluding the style). Antennal colour may be termed yellowish brown.

Thorax. Chaetotaxy as in male. Mesonotum less intensely tomentose than in male, with two narrow and rather distinct, tomentose stripes (as in *antennata*). The area between these stripes is brownish black and distinctly different from the more steely black colour of the areas lateral to the two narrow stripes. Mesonotal pile short, consisting of erect black hairs and adpressed golden hairs. Scutellum and pleura as in male, but with shorter pile.

Wings. Cell R_4 2·5 times as long as wide. Vein R_4 as in male. Colour slightly darker than in male. Halteres whitish.

Legs. Chaetotaxy of f_1 and f_3 as in male. Colour mainly as in male, but f_1 and f_2 less intensely darkened (? due to bleaching), and f_3 yellowish brown to brown, thus distinctly paler than in male.

Abdomen. Tergites polished black, tergites 2–3, and 5, with lateral spots of whitish grey tomentum as shown in the figure. Pile short and mainly blackish, only whitish and tomentose areas of tergites 2–3. Sternites brownish black and shining. Ovipositor with two lateral groups of 6 slender, pointed spines.

Total length 6·9 mm–7·6 mm.

DISTRIBUTION. Hitherto known only from Nigeria, where it seems to be widespread, though rare.

MATERIAL EXAMINED.

Holotype ♂, NIGERIA: Zaria, Samaru, m.v.trap, 28.ii.1968 (*J. C. Deeming*) (BMNH).

Paratypes. NIGERIA: Zaria, Samaru, 1 ♀, 30.i.1972 (*J. C. Deeming*) (ZMC); Ibadan, 1 ♀, ii. 1963, mounted from alcohol (*D. C. Eidt*) (CNC); Niger Prov., near Mokwa, Zugurma, on wet mud beside stream, 2 ♂, 22.xii.1971 (*J. C. Deeming*) (BMNH & ZMC); Mid-West State, Agbor, 1 ♀, 26.xii.1970 (*H. Politzar*) (BMNH).

Schoutedenomyia langi (Curran) **comb. n.**

(Text-figs 14, 46–54)

Psilocephala langi Curran, 1928 : 173; Kröber, 1933 : 295. Holotype ♂, ZAIRE (AMNH) [examined].

DIAGNOSIS. ♂. Similar to *antennata*, but frons less raised and frontal callus not so polished black due to longitudinal grooves. One *sa* and two *sc* setae. Halteres blackish. Cell M_3 short-petiolate. Femora dark. Abdomen slender as in *antennata*, but terminalia blackish.

♀. Unknown.

REDESCRIPTION. ♂. *Head* (Text-fig. 14). Facial index 0·58. Frons less raised than in *antennata* and with a shining blackish callus with longitudinal grooves. Upper and lateral parts of frons greyish tomentose, as must also be genae and occiput but these areas are discoloured in the single specimen available. About 10 short post-ocular + occipital setae on each side. Antennae blackish brown; pile short and black.

Thorax. 1 *sa* seta, 2 *sc* setae. The pattern of mesonotum is difficult to discern due to discolouration, but there are certainly two rather broad stripes of greyish tomentum on an otherwise blackish mesonotum. Mesonotal pile ca 0·10 mm long and dark. Scutellum greyish tomentose and with short pale hairs. Pleura appearing blackish due to discolouration, but certainly also predominantly greyish tomentose.

Wings. Cell R_4 as long as wide. Vein R_4 narrowly S-shaped. Cell M_3 short-petiolate. Colour hyaline with dark brownish veins and stigma. Knob of halteres blackish.

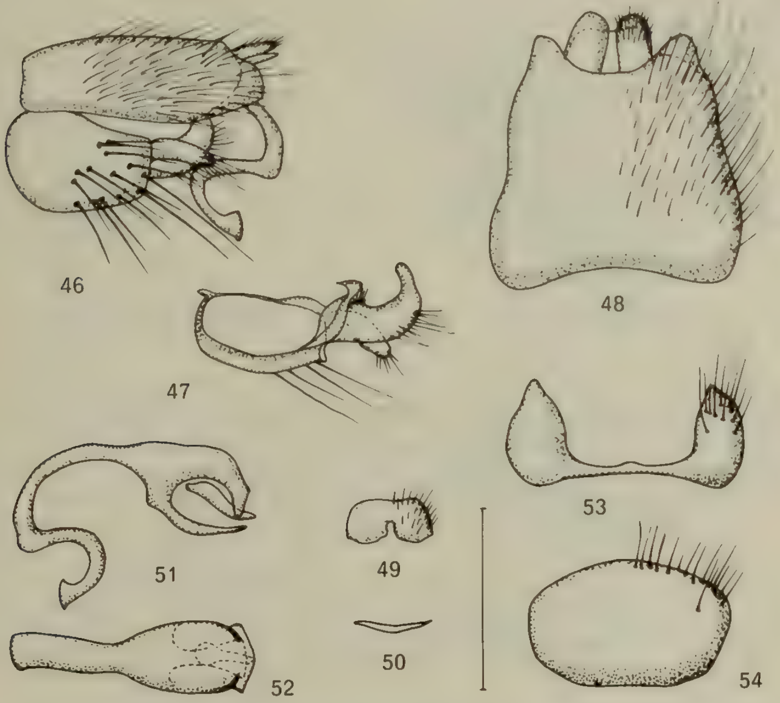
Legs. These are lost in the holotype, except for right p_2. F_2 blackish brown and without setae. T_2 and its tarsus yellowish brown.

Abdomen. Pattern difficult to describe because of discolouration, but the tergites will certainly all appear silvery greyish tomentose in dorsal view. Blackish areas appear laterally when viewed from behind. Pile sparse and whitish. Sternites blackish, being thinly greyish tomentose when viewed from behind. Pile blackish on the last sternites.

Terminalia (Text-figs 46–54). Entirely shining blackish, with black pile. Epandrium as in Text-fig. 48. Cerci not enlarged. Paraproct as in Text-fig. 49. Gonocoxite (Text-fig. 46) strikingly shorter than epandrium; its posterior margin abruptly truncate. Distal end of dorsal gonocoxal process long and comparatively broad. Stylus and phallic part of aedeagus also distinctly visible in lateral view. Stylus in ventral view broad and strongly curved distally, its apex being indistinctly dentate. Ventral lobe long, narrow and lamellate. Hypandrium (Text-fig. 50) very small. Aedeagus very large. The strongly sinuate phallus in particular (Text-fig. 51) comparatively broad and trumpet-shaped at apex; in dorsal view (Text-fig. 52) it is of the same width throughout. Dorsal apodeme short and strongly downcurved distally (Text-fig. 51); in dorsal view almost oval. Tergite 8: Text-fig. 53. Sternite 8: Text-fig. 54.

♀. Unknown.

Total length 6·0 mm.



FIGS 46–54. Male terminalia of *Schoutedenomyia langi*, holotype. 46, genitalia in lateral view; 47, right gonocoxite in intervo-ventral view; 48, epandrium in dorsal view; 49, paraproct; 50, hypandrium; 51, aedeagus in lateral view; 52, aedeagus in dorsal view; 53, tergite 8; 54, sternite 8. Scale: 0·5 mm.

MATERIAL EXAMINED.

Holotype ♂, ZAIRE: Stanleyville, 10.iv.1915 (*Lang & Chapin*) (AMNH). The specimen is in a bad condition, as all the legs are lost except one, and the head and body are discoloured. However, the terminalia are very characteristic and should enable the species to be recognized again in the future.

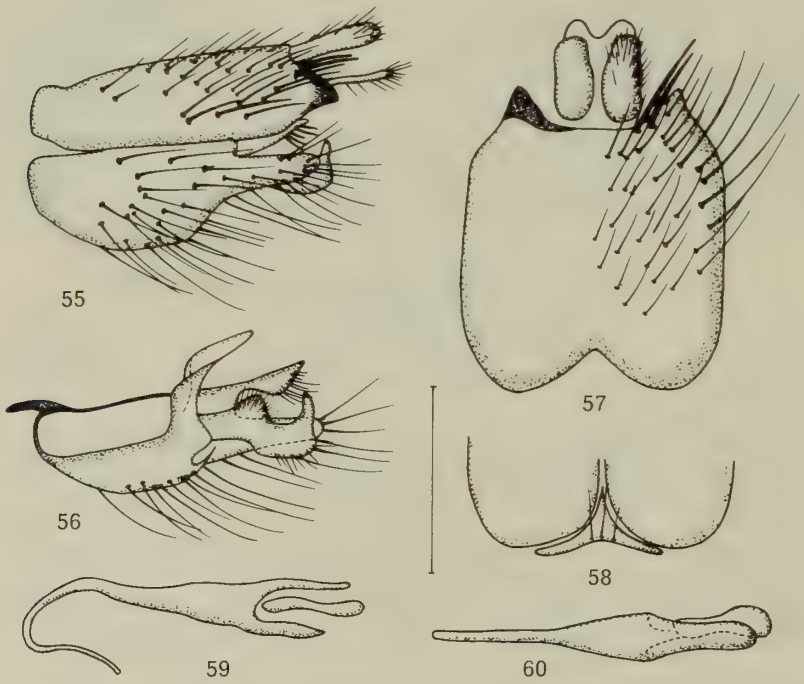
Schoutedenomyia kroeberi **sp. n.**

(Text-figs 18, 55–60)

DIAGNOSIS. ♂. Frons blackish and subshining, i.e. covered by thin tomentum. Antennal pile short (Text-fig. 18). 1 *sa* and 4 *sc* setae. Halteres brownish black. Cell M_3 open. Femora dark brownish to yellowish brown. Abdomen slender and tomentose all over, except on anterior corners of tergites 2–4. Terminalia reddish yellow.

♀. Unknown.

DESCRIPTION. ♂. *Head* (Text-fig. 18). Facial index 0·55. Frons slightly raised and with a subshining, blackish brown callus. Thick whitish grey tomentum present along eye-margin. Face and occiput with a comparatively thin layer of whitish grey tomentum; upper part of occiput appearing mainly subshining. About 15 post-ocular and occipital setae on each side. Antennae dirty brownish with black pile.



FIGS 55–60. Male terminalia of *Schoutedenomyia kroeberi*, holotype. 55, genitalia in lateral view; 56, right gonocoxite in intero-ventral view; 57, epandrium in dorsal view; 58, bases of gonocoxites and hypandrium in ventral view; 59, aedeagus in lateral view; 60, aedeagus in dorsal view. Scale: 0·5 mm.

Thorax. 1 *sa* seta; 4 *sc* setae, the lateral pair short and weak. Mesonotum black and subshining; with two indistinct, whitish tomentose stripes. The area between these stripes of a more brownish black colour than the areas lateral to the stripes. Mesonotal pile long (ca 0·25 mm) and pale. Scutellum and pleura as in *antennata*.

Wings. Cell R_4 2·6 times as long as wide. Proximal part of vein R_4 straight. Cell M_3 narrowly open. Colour hyaline, with a greyish brown tinge. Stigma and veins dark brownish. Halteres brownish black.

Legs. F_1 and f_2 without setae. F_3 with 3–4 short *av* setae in apical half. Coxae whitish grey tomentose. Femora dark brownish, f_1 and f_2 being more yellowish brown towards tips. T_1 and t_2 yellowish brown, t_3 dark brownish. Tarsi coloured as their corresponding tibiae.

Abdomen. Cylindrical and narrow in shape as in *antennata* (Text-fig. 24). All tergites appearing entirely whitish grey tomentose in anterior and dorsal views; in lateral and posterior views appearing less tomentose, as the brownish black ground-colour is distinctly visible. Extreme anterior corners of tergites 2–4 shining. Pile mainly whitish. Sternites mainly shining brownish to blackish.

Terminalia (Text-figs 55–60). Entirely reddish yellow with black pile. Epandrium (Text-fig. 57) with the posterior corners distinctly dentate and dark pigmented. A few very strong setae on posterior margin of epandrium. Posterior margin of gonocoxite (Text-fig. 55) with a long projection. Distal end of dorsal gonocoxal process comparatively short, but distinctly visible in both lateral (Text-fig. 55) and ventral (Text-fig. 56) views. Stylus (Text-fig. 56) of a characteristic shape; its ventral margin suddenly bent at an angle of 90 degrees; its dorsal margin with a semicircular emargination. Ventral lobe long, forming a fixed extension of the ventral margin of the gonocoxite. Hypandrium (Text-fig. 58) comparatively large, with 3 small hairs. Aedeagus (Text-figs 59, 60) of almost the same shape as in *antennata*, though phallus distinctly shorter and therefore not visible in external view (Text-fig. 55). Tergite 8 and sternite 8 were not found to be intact during dissection.

Total length 7·2 mm.

♀. Unknown.

MATERIAL EXAMINED.

Holotype ♂, MOZAMBIQUE: Siluwe Hills west of Beira, 5.ix.1964 (*D. Cookson*) (NM).

Schoutedenomyia macroptera (Kröber) **comb. n.**

(Text-figs 15, 61–67)

Psilocephala macroptera Kröber, 1929 : 424. Holotype ♂, TANZANIA (ZMB) [examined].

DIAGNOSIS. ♂. Frons entirely and densely whitish grey tomentose. Antennal pile (Text-fig. 15) longer than in any other species of the genus. 2 *sa* and 4 *sc* setae. Halteres and femora brownish black. Abdomen whitish grey tomentose with small black areas on anterior corners of tergites 2–5. Terminalia reddish yellow.

♀. Unknown.

REDESCRIPTION. ♂. *Head* (Text-fig. 15). Facial index 0·58. All parts of head intensely whitish grey tomentose. About 13 long post-ocular + occipital setae on each side. First antennal segment slightly shorter and narrower than third segment. Antennae blackish, first segment with thin greyish tomentum and black pile which is longer than the segment is wide.

Thorax. 2 *sa* setae, 4 long *sc* setae. Mesonotum black and dulled by greyish tomentum. A vaguely delimited, subshining brownish black median band flanked by two stripes, with rather intensely pale greyish tomentum. Mesonotal pile long (ca 0·40 mm) and erect, consisting of both pale and dark hairs. Scutellum and pleura black and greyish tomentose all over except on pteropleuron; the pile whitish and long.

Wings. Cell R_4 2·3 times as long as wide. Vein R_4 forming a rather wide S. Cell M_3 open in the holotype, short-petiolate in the other specimen available. Colour hyaline, with a very faint greyish brown tinge. Veins, stigma and halteres brownish black.

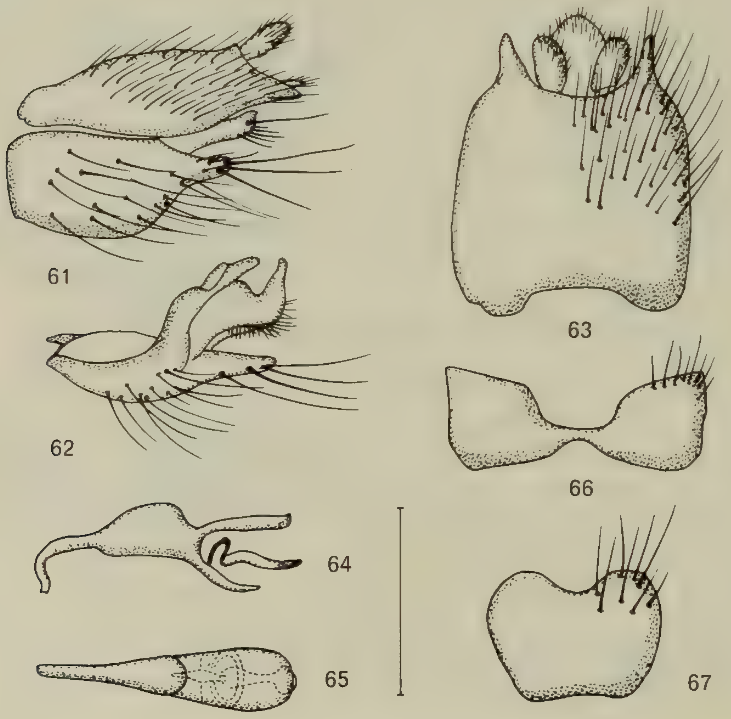
Legs. F_1 without setae. F_3 with 2 short *av* setae in apical half. Coxae greyish tomentose. Femora blackish brown, but pale brownish at extreme tips; f_3 with pale scaly hairs on anterior surface. T_1 and its tarsus blackish; other tibiae and tarsi brownish to brownish black.

Abdomen. Of practically the same shape as in *antennata* (Text-fig. 24). All tergites silver whitish grey tomentose, the extreme anterior corners of tergites 2–5 being blackish and shining. Pile long and whitish. Sternites 1–4 partly tomentose and whitish pilose; the following sternites more shining and with darker pile.

Terminalia (Text-figs 61–67). Entirely reddish yellow, with black pile. Epandrium (Text fig. 63) with posterior corners pointed. Posterior margin of gonocoxite (Text-fig. 61) with a moderately long projection. Distal end of dorsal gonocoxal process comparatively long and strikingly prominent in lateral view (Text-fig. 61). Stylus (Text-fig. 62) very broad proximally, terminating in a gradually narrowing hook. Ventral lobe as in the preceding species. Aedeagus comparatively small, in lateral view (Text-fig. 64) with the proximal part of phallus dilated like a balloon; in dorsal view (Text-fig. 65) quite slender, as usual in the genus. Tergite 8: Text-fig. 66. Sternite 8: Text-fig. 67.

Total length 6·0–6·8 mm.

♀. Unknown.



FIGS 61–67. Male terminalia of *Schoutedenomyia macroptera*, holotype. 61, genitalia in lateral view; 62, right gonocoxite in intero-ventral view; 63, epandrium in dorsal view; 64, aedeagus in lateral view; 65, aedeagus in dorsal view; 66, tergite 8; 67, sternite 8. Scale: 0·5 mm.

DISTRIBUTION. Tanzania and Mozambique.

MATERIAL EXAMINED.

Holotype ♂, TANZANIA: Nyassa-See, Langenburg, 12.v.1899 (*Fülleborn*) (ZMB); the specimen has lost both front legs, parts of the other legs and both third antennal segments.

MOZAMBIQUE: Tumbine Mountain, Milange, 1 ♂, vii. 1957 (*B. & P. Stuckenberg*) (NM).

Schoutedenomyia congoensis Kröber

(Text-figs 3, 4, 20, 26)

Schoutedenomyia congoensis Kröber, 1936 : 257. Holotype ♀, ZAIRE (MCT) [examined].

DIAGNOSIS. ♂. Unknown.

♀. Frons with a tomentose stripe along entire eye-margin (Text-fig. 3). First and third antennal segments of equal length (Text-fig. 4). 2 *sa* and 2 *sc* setae. Wing unicolourous (Text-fig. 26). Cell R_4 very long, more than 4 times as long as wide, and cell M_3 closed. Halteres brownish. Front leg slender (Text-fig. 20).

REDESCRIPTION. ♂. Unknown.

♀. *Head* (Text-figs 3, 4). Facial index 0·61. Frons comparatively narrow, its width at level of anterior ocellus 0·30 mm and at level of antennae 0·65 mm. Head in lateral view with a rather broad gena, a comparatively slender proboscis, and the antennae directed downwards. First and third antennal segments of equal length. Style short and narrow, i.e. not conical. Head discoloured, but frons apparently with a distribution of shining blackish and greyish tomentose areas as shown in Text-fig. 3. The face is also greyish tomentose, but the gena may be blackish or brownish and have a short black pile. Occiput greyish tomentose below, more blackish grey above. About 15 post-ocular + occipital setae on each side. Antennae yellowish brown to darker brownish, not tomentose, antennal pile short and black.

Thorax. 2 *sa* setae, 2 *sc* setae. Mesonotum discoloured, but apparently almost uniformly blackish with thin greyish tomentum. Mesonotal pile mainly yellowish. Scutellum and pleura also blackish, with greyish tomentum.

Wings (Text-fig. 26). Cell R_4 about 4 times as long as wide, i.e. remarkably long and narrow. Proximal part of vein R_4 almost straight, then downcurved, and apical part again more straight. Cell M_3 closed at wing-margin. Colour hyaline, with a distinct greyish brown tinge, most intensely along anterior margin. Veins and stigma dark brownish. Halteres brownish.

Legs (Text-fig. 20). F_1 with 1 short *av* seta. F_3 with 2–3 short *av* and *pv* setae at tip. T_1 and its metatarsus (Text-fig. 20) slender. T_1 with 5–7 *ad* setae which are shorter than tibial width, and 3 *pv* setae as long as tibial width. Coxae whitish grey tomentose. Femora, tibiae and tarsi brownish to dark brownish.

Abdomen. The pattern cannot be described because of extensive discolouration, but may be more or less as in *samaruensis*. The number of terminal spines cannot be given.

Total length 7·8 mm.

REMARKS. Kröber's description is adequate, but his illustration of the head in lateral view is quite misleading as can be seen by comparing his figure with Text-fig. 4. The generic name on Kröber's determination label reads 'Schoutedenia' and not *Schoutedenomyia*.

DISTRIBUTION. Zaire and Angola.

MATERIAL EXAMINED.

Holotype ♀, ZAIRE: Moanda, 24.viii.1920 (*Dr H. Schouteden*) (MCT); the specimen is discoloured by damp.

ANGOLA: Luanda, 1 ♀, 9.x.1949 (*Malkin*) (CAS).

***Schoutedenomyia signata* sp. n.**

(Text-figs 5, 6, 21, 27)

DIAGNOSIS. ♂. Unknown.

♀. With a small tomentose area at eye-margin on middle of frons (Text-fig. 5). First antennal segment long. Wing with two broad, but imprecisely delimited brownish bands (Text-fig. 27). Cell R_4 about 3 times as long as wide, and cell M_3 long-petiolate. Halteres blackish. Front leg (Text-fig. 27) slightly stronger than in *congoensis*.

DESCRIPTION. ♂. Unknown.

♀. *Head*. (Text-figs 5, 6). Facial index 0·56. Frons as in Text-fig. 5. It is distinctly broader than in *congoensis*, its width at level of anterior ocellus 0·35 mm and at level of antennae 0·70 mm. Head in lateral view (Text-fig. 6) with gena rather broad and proboscis and palpus comparatively slender. First antennal segment distinctly longer than in *congoensis*; third segment lost. Frons almost entirely blackish, with only two small areas of greyish tomentum at eye-margin about midway between antennal bases and ocellar triangle. Lower part of frons raised and more polished than the rest, which appears dulled by fine punctures, but without a sharp line of demarcation. Face, genae and lateral areas of lower occiput with thin greyish tomentum. Other areas of occiput blackish, upper part polished. About 12 post-ocular and occipital setae on each side.

Thorax. The chaetotaxy cannot be described. Mesonotum blackish when seen from in front, with only thin tomentum, and thus appearing subshining. Seen from behind, two narrow tomentose stripes appear on the anterior part, while the posterior part in front of scutellum has a broad tomentose band. Mesonotal pile rubbed. Scutellum deep blackish in colour, from some angles with dark brownish tomentum. Pleura blackish and only thinly whitish grey tomentose, more shining on a stripe from pteropleuron to anterior part of hypopleuron.

Wings (Text-fig. 27). Cell R_4 about 3 times as long as wide. Vein R_4 narrowly S-curved. Cell M_3 long-petiolate. Colour greyish hyaline; apical fourth of wing brownish tinged, and discal cell with a band. Veins and stigma dark brownish. Halteres blackish.

Legs (Text-fig. 21). Only the right front leg preserved. F_1 with 2 small *av* setae; t_1 with 3–4 *ad*, *pd* and *pv* setae, all of which are shorter than width of t_1. T_1 and its metatarsus rather stronger than in *congoensis*. F_1 blackish brown, t_1 yellowish brown, tarsus darker brownish.

Abdomen. Seen from in front with the tergites covered by thin whitish grey tomentum, and with a brownish tinge on the first two tergites. Seen from above and from behind, all tergites blackish and shining with whitish grey lateral tomentose spots on tergites 2–4. The first tergites with the pile nearly all rubbed off, the last tergites with short, black and erect pile. The number of terminal spines cannot be given.

Total length 7·9 mm.

MATERIAL EXAMINED.

Holotype ♀, ZAIRE: Lusinga, Galerie riv. Lusinga, 25.v.1945 (*G. F. de Witte*) (IPNB).

***Schoutedenomyia lindneri* sp. n.**

(Text-figs 7, 8, 22, 28)

[*Psilocephala aethiopica* (Bezzi) sensu Lindner, 1955 : 20. Misidentification.]

DIAGNOSIS. ♂. Unknown.

♀. With a small tomentose area at eye-margin on middle of frons (Text-fig. 7), as in *signata*, but wings unicolourous (Text-fig. 28). Cell R_4 about 3 times as long as wide, and cell M_3 short-petiolate. Halteres blackish brown. Front legs quite slender as in *congoensis* (Text-figs 20, 22).

DESCRIPTION. ♂. Unknown.

♀. *Head* (Text-figs 7, 8). Facial index 0·56. Frons as in Text-fig. 7; its width at level of anterior ocellus 0·30 mm and at level of antennae 0·70 mm. Head in lateral view (Text-fig. 8) with gena comparatively narrow and proboscis thick. First antennal segment slightly longer than third segment (ratio 40 : 38). Style very short and narrow. Pattern of frons practically as in *signata*. Face, genae and occiput with a very dark appearance, but this may be partly due to discolouration; these areas are certainly greyish tomentose in well-preserved specimens. About 12 post-ocular + occipital setae on each side. Antennae dirty brownish.

Thorax. 1 *sa* seta, 4 *sc* setae of equal length. Mesonotum seen from in front covered by rather thick whitish grey tomentum which has a brownish tinge on two stripes close to the mid-line, only the notopleura appearing blackish. Seen from behind, mesonotum with a cinnamon-brown median band (width ca 0·25 mm) flanked by two greyish bands (width ca 0·20 mm), and lateral parts of mesonotum blackish and subshining. Postalar calli and scutellum pale brownish black and shining when seen from behind, but scutellum with a tomentose appearance when seen from in front. Mesonotal pile consisting of short black erect hairs and longer yellowish adpressed hairs. Lower parts of mesopleuron and sternopleuron polished black, and pteropleuron brownish and without tomentum. Other parts of pleura with whitish grey tomentum.

Wings (Text-fig. 28). Cell R_4 3 times as long as wide. Proximal part of vein R_4 straight, followed by a deeply curved distal part. Cell M_3 short-petiolate. Colour greyish hyaline, with pale greyish brown veins and stigma. Halteres blackish brown.

Legs (Text-fig. 22). F_1 and f_2 without setae. F_3 with 2 short *av* setae near apex and some even shorter *pv* setae. T_1 and its metatarsus (Text-fig. 22) slender. T_1 with 2–4 *ad*, *pd* and *pv* setae, 1 or 2 of which may be as long as width of t_1. Coxae whitish grey tomentose. Femora blackish brown, slightly tomentose and densely covered with whitish scaly hairs. Tibiae and tarsi yellowish brown, the tarsi darker towards tips.

Abdomen. Seen from in front, tergites shining blackish to blackish brown, with postero-lateral corners of tergites 2–3 and larger areas of tergite 4 thinly whitish grey tomentose. Seen from behind with the same pattern, but with the tomentose areas less distinct. Pile short, whitish on lateral areas of tergites 1–3, blackish on the rest. 6 + 6 terminal spines, which are short and thick but sharply pointed.

Total length 8·7 mm.

MATERIAL EXAMINED.

Holotype ♀, KENYA: Nairobi, 20.vi.1952 (*D. O. Africa Exp.*), det. *Psilocephala aethiopica* Bezzi by Oldroyd, 1952 (SMNS).

***Schoutedenomyia leclercqi* sp. n.**

(Text-figs 9, 10, 23, 29)

DIAGNOSIS. ♂. Unknown.

♀. Frons without tomentose areas at eye-margin. First antennal segment shorter than third segment (Text-fig. 10). 1 *sa*, 2 *sc* setae. Wing (Text-fig. 29) unicolourous. Cell R_4 only 2·7 times as long as wide, and cell M_3 short-petiolate. Halteres blackish.

DESCRIPTION. ♂. Unknown.

♀. *Head* (Text-figs 9, 10). Facial index 0·68. Frons as in Text-fig. 9, its width at level of anterior ocellus 0·35 mm and at level of antennae 0·75 mm. Head in lateral view (Text-fig. 10) with gena comparatively narrow and frontal protuberance lower than in preceding species. Proboscis of moderate size. Antennae may be more porrect than in other species. First antennal segment shorter and narrower than third segment (ratio 28 : 40). Style very short and narrow. Frons unicolourous blackish and smooth, but not polished because of thin greyish tomentum; upper part with an undulating depressed line. Face, genae and occiput blackish brown, only occiput thinly tomentose. About 15 post-ocular + occipital setae on each side. Antennae blackish, not tomentose; first segment with the pile very short and sparse.

Thorax. 1 *sa* seta, 2 *sc* setae. Colour of mesonotum blackish, dulled by greyish tomentum which is most distinct when seen from behind. Two narrow and broadly separated blackish stripes present in the holotype, but certainly due to discolouration by moisture; these stripes may well be pale tomentose in perfectly preserved specimens. Pile short, mainly blackish on anterior part, paler on posterior part. Scutellum coloured as mesonotum and with whitish pile. Pleura partly discoloured, but apparently thinly tomentose.

Wings (Text-fig. 29). Cell R_4 2·7 times as long as wide. Vein R_4 forming a narrow S. Cell M_3 short-petiolate. Colour hyaline with a greyish brown tinge, especially along the veins. Veins and stigma dark brownish to blackish. Halteres blackish.

Legs (Text-fig. 23). F_1 and f_2 with 1–2 short *av* setae. F_3 with 6 short *av* setae; *pv* setae absent. T_1 with about 5 *ad*, *pd* and *pv* setae, of which the dorsal setae are short and adpressed. T_1 and its metatarsus thickened (Text-fig. 23). Femora blackish brown to blackish, only thinly tomentose. Pile mainly whitish, and partly scaly. T_1 and its tarsus blackish. Tibiae and tarsi of p_2 and p_3 paler, yellowish brown to dark brownish.

Abdomen. All tergites uniformly blackish and very thinly greyish tomentose. A distinct pattern is not visible, but specimens in better condition may have a pattern of blackish and greyish tomentose areas. Pile short and consisting of both whitish and blackish hairs. The number of terminal spines cannot be given.

Total length 8·0 mm.

MATERIAL EXAMINED.

Holotype ♀, ZAIRE: Leopoldville, 8.x.1950 (*M. Leclercq*) (IRSNB).

***Schoutedenomyia longeantennata* sp. n.**

(Text-figs 11, 12)

DIAGNOSIS. ♂. Unknown.

♀. Easily recognized by the very elongate first antennal segment and the subapical position of the style. Frons (Text-fig. 11) with only a small area of tomentum laterally. 1 *sa* and 2 *sc* setae. Wing unicolourous. Cell R_4 about 2·5 times as long as wide, and cell M_3 petiolate. Halteres yellowish brown. Femora yellowish brown.

DESCRIPTION. ♂. Unknown.

♀. *Head* (Text-figs 11, 12). Facial index 0·66. Frons (Text-fig. 11) comparatively short and broad, largely shining black with only two small wedge-shaped areas of whitish grey tomentum laterally. Head in lateral view with the gena very narrowly visible. Proboscis short, not reaching to level of antennal bases. Antennae directed downwards, their axes continuing the profile-line of the frons. First antennal segment very long, nearly twice as long as length of head, and about ten times as long as its maximum width. Third antennal segment one-third as long as first segment, tapering gradually. Antennal style not apical, but inserted into a groove on outer surface at base of apical third of segment 3. Third antennal segment yellowish in basal part, becoming dark brownish in more than apical half. Second and third segments blackish. First segment with the pile rather short but dense. About 10 post-ocular + occipital setae on each side. Face, lower occiput and broad post-ocular stripe whitish grey tomentose. Upper central part of occiput shining blackish.

Thorax. 1 *sa* seta, 2 short *sc* setae. Mesonotum subshining blackish with two indistinct paler greyish stripes. Mesonotal pile short, adpressed and yellowish. Scutellum shining black. Pleura thinly whitish grey tomentose.

Wings. Cell R_4 about 2·5 times as long as wide. Vein R_4 almost straight. Cell M_3 short-petiolate. Colour hyaline, with a greyish brown tinge. Veins and stigma dark brownish. Halteres yellowish brown.

Legs. Only the right p_1 and p_2 are preserved. F_1 with 2 small *av* setae. F_2 apparently without *av* setae. T_1 with 2–3 short *ad*, *pd* and *pv* setae, all of which are shorter than tibial width. T_2 with the usual four rows of setae, but one *ad* seta and one *av* seta appear to be extraordinarily strong. Coxae greyish, like the pleura. Femora and tibiae bright yellowish brown. Tarsi darkened.

Abdomen. Tergites shining blackish, with greyish tomentose areas on lateral parts of tergites 3 and 5. Sternites also predominantly shining blackish. Abdominal pile sparse and very short. 6 + 6 slender and pointed apical spines on ovipositor.

Total length 9·2 mm.

MATERIAL EXAMINED.

Holotype ♀, RHODESIA: Mt Selinda, xi–xii. 1930 (*R. H. R. Stevenson*) (CNC).

***STENOPOMYIA* gen. n.**

Gender: feminine.

Type-species: *Stenopomyia keiseri* sp. n.

DESCRIPTION. *Head.* Male eyes touching, nearly touching, or separated by a comparatively broad frontal stripe (Text-figs 69, 71, 73). Upper facets of male eyes not enlarged. Male frons with various patterns formed by blackish, brownish or greyish tomentum, sometimes with more or less shining areas on lower part. Female frons (Text-figs 68, 70) always broader than male frons and often with a similar pattern to that of the male. Face short and widening slightly below. Facial indices varying between 0·32 and 0·47, i.e. the lowest values of the genera under treatment. Proboscis short, often reaching only to level of antennal base, or to about level of middle of first antennal segment. Labella broad. Palpi one-segmented, shorter than proboscis and usually with only a short pile. Male frons bare. Female frons usually with short black hairs. Genae usually not visible in lateral view. Lower occiput with whitish pile. Upper part of occiput with the post-ocular and occipital setae varying greatly in number. Antennae (Text-figs 75–86) usually with the first segment shorter than combined length of third segment and style. However, in the *variegata*-group the first antennal segment is longer than combined length of third segment and style. Antennal style usually long, but ratio of the two basal sections very variable. Total length of style more than 40 per cent of length of third antennal segment.

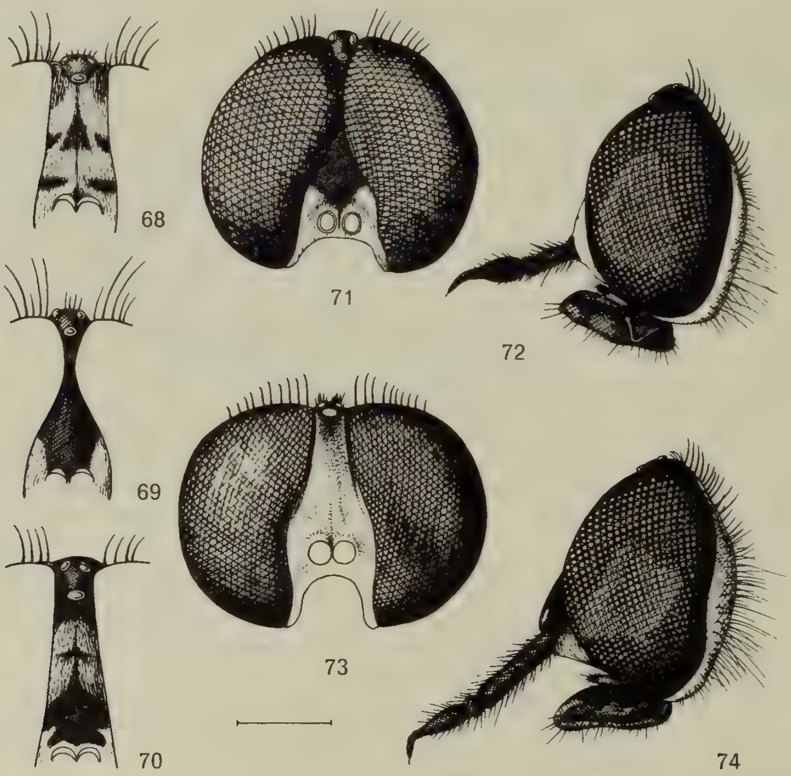
Thorax. 3 notopleural, 1–2 supraalar and 1 postalar setae. Dorsocentral setae never present. 2–4 scutellar setae. Colour very variable. Prosternum with whitish pile only on lateral areas. Sternopleuron entirely bare. Mesopleuron and metapleural callosity with moderately long and whitish pile. Pleura more or less tomentose, the tomentum of different colour in some species and thus forming a pattern.

Wings. Cell R_4 usually long and narrow, and vein R_4 of variable curvature (Text-figs 87, 88). Cell M_3 usually more or less widely open, only rarely closed at wing-margin. Wing-colour hyaline or with a greyish, greyish brown or dark brownish tinge, sometimes more darkened apically than basally, but never distinctly banded.

Legs. Coxae usually of the same colour as pleura, but anterior and middle coxae distinctly paler than posterior coxae in a few species. Coxae never with pile on posterior surfaces. Hind femora with a few to several anteroventral setae; these are usually short, and some even shorter posteroventral setae may also occur. F_1 and f_2 without or with a few *av* setae. Front tibiae with some *ad*, *pd* and *pv* setae, some of which are as long as or longer than width of t_1. T_2 and t_3 with rows of long *ad*, *pd*, *av*, and *pv* setae, and often with some additional and shorter true ventral setae.

Abdomen. Slender and cylindrical. The male abdomen shows strong interspecific variation in regard to colour. In some species the tergites are almost entirely shining, without tomentum or with only small areas of tomentum on posterior corners of the first tergites. Other species have the tergites practically entirely covered with a thick layer of tomentum, and all intermediate conditions occur. In some species the female abdomen is only slightly differentiated from the male abdomen; in other species there is a strong sexual difference. Abdominal pile is usually rather sparse and short.

Male terminalia. The epandrium shows a strong interspecific variation in size and shape. Most species show modifications in the shape, especially of the posterior margin. The cerci are always simple, and the paraproct forms a small sclerotized plate (Text-fig. 99) which never continues into a sclerotized area of the intersegmental membrane. The gonocoxite of rather uniform shape, always distinctly shorter than epandrium and with a more or less pronounced projection on posterior part, this projection only absent in *ostentata* (Text-fig. 89) which has a large rounded lobe posteriorly and more internally. The distal end of dorsal gonocoxal process of rather variable shape and length, but always rounded at apex; only specialized in *distincta* (Text-figs 132, 133). The same is true of the ventral lobe and the stylus. The stylus only

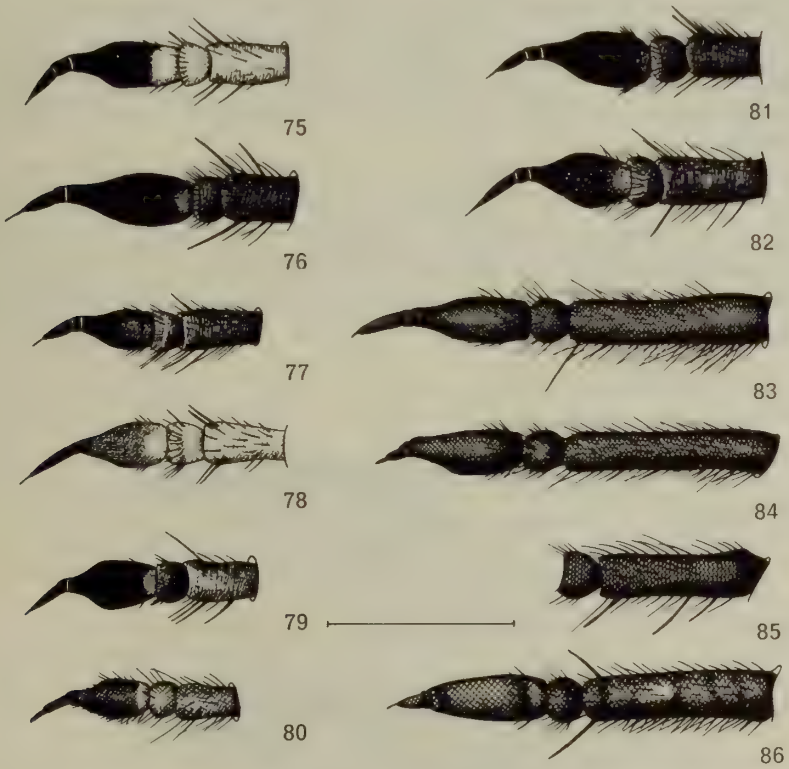


FIGS 68–74. *Stenopomyia.* 68, *S. ostentata*, ♀ frons; 69, *S. obscura*, ♂ frons; 70, *S. rhagioniformis*, ♀ frons; 71, *S. keiseri*, head in frontal view of ♂ holotype; 72, same in lateral view; 73, *S. angulata*, head in frontal view of ♂ holotype; 74, *S. variegata*, head in lateral view of ♂. Scale: 0·5 mm.

slightly curved and never forming an apical hook as in *Schoutedenomyia*. The ventral lobe is specialized in *distincta* (Text-fig. 133). The hypandrium (Text-fig. 113) is always small, free and situated between ventral bases of gonocoxites. The aedeagus is free, and is basically long and slender in shape, with the phallic part only slightly curved (sole exception: *ostentata* (Text-fig. 92)). The dorsal apodeme may be totally reduced as in *distincta*, but is usually 2 to 3 times as wide as proximal part of phallus; only in *ostentata* (Text-fig. 92) is the dorsal apodeme differently shaped. The ventral and ejaculatory apodemes are usually quite simple and comparatively slender. Tergite 8 is very narrow medially. Sternite 8 is well-developed and of rather variable shape.

Female terminalia. With two rows of terminal spines, as is usual in the group; the number varies between 4 and 7.

REMARKS. The genus *Stenopomyia* consists of 13 species, and only one of these proves to be described. It is *variegata*, originally described in *Anabarhynchus* Macquart, which is a strictly Australian genus. In the Ethiopian region *Stenopomyia* seems to be restricted to Madagascar, where the late Dr Fred Keiser collected most



FIGS 75–86. Antennae of *Stenopomyia*. 75, *S. ostentata*, ♂ holotype; 76, *S. obscura*, ♂ holotype; 77, *S. bidentata*, ♂ holotype; 78, *S. rhagioniformis*, ♂ holotype; 79, *S. brunnea*, ♂ holotype; 80, *S. minor*, ♂ holotype; 81, *S. keiseri*, ♂ holotype; 82, *S. angulata*, ♂ holotype; 83, *S. variegata*, ♂; 84, *S. fumipennis*, ♂ holotype; 85, *S. fuscata*, ♂ holotype; 86, *S. uncilobata*, ♂ holotype. Scale: 0·5 mm.

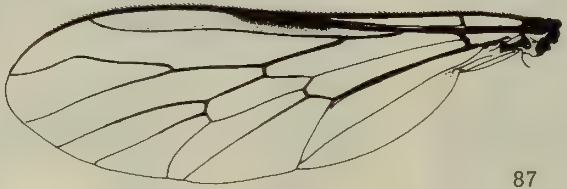
of the present material in 1958. The author has examined a number of Oriental species of the *Psilocephala*-group, but was unable to place any of them in *Stenopomyia*. However, dissections of the male terminalia were not made.

At present the author considers that *Stenopomyia* represents a monophyletic group. There are several characters which may be regarded as plesiomorphic; for example the rounded head with only slightly diverging facial margins resulting in facial indices between 0·32 and 0·47, the bare face, the presence of hairs only on the lateral parts of prosternum, the entirely bare sternopleuron, the bare posterior surface of cx_1 and cx_2, the comparatively long and slender cell R_4, and the open cell M_3.

As synapomorphic for the genus may be listed the entirely bare male frons, the strong modifications of the epandrium (especially its posterior margin), and the usually very slender and elongate aedeagus.

The two large and more advanced Ethiopian Therevid genera, *Irwiniella* and *Thereva*, have the prosternum haired all over, an entirely haired sternopleuron, presence of hairs on posterior surface of cx_1 and cx_2, dorsocentral setae usually present, and cell R_4 comparatively shorter and broader. The male frons of *Irwiniella* and *Thereva* may be bare, but is usually haired, the epandrium is usually simple or only slightly modified, and the aedeagus is basically broader and shorter. The small genus *Stenosathe* represents a transition between *Stenopomyia* and *Irwiniella*; see further on p. 247.

The relationship between *Stenopomyia* and *Schoutedenomyia* is less clear. *Schoutedenomyia* possesses many of the plesiomorphic characters mentioned above for *Stenopomyia*, while others are present in a more apomorphic state in *Schoutedenomyia*, such as the shortened antennal style, the usually petiolate cell M_3, and the partial reduction of the setae on t_1. *Schoutedenomyia* has further apomorphies in the male terminalia (see p. 205) and a strongly plesiomorphic character in the two-segmented palpus.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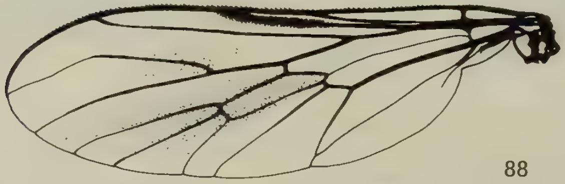
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FIGS 87, 88. Wings of *Stenopomyia*. 87, *S. variegata*; 88, *S. brunnea*. Scale: 0·5 mm.

KEY TO SPECIES OF *STENOPOMYIA*

1 First antennal segment shorter than combined length of third antennal segment and style (Text-figs 75–82) 2

– First antennal segment longer than combined length of third antennal segment and style (Text-figs 83–86) 14

2 Minimum width of frontal stripe shorter than or equal to width of anterior ocellus (Text-figs 69, 71) 3

– Minimum width of frontal stripe larger than width of anterior ocellus (Text-figs 68, 70, 73) 6

3 Abdomen black, either almost entirely shining or entirely whitish grey tomentose. Femora brownish black to black. Antennae blackish 4

– Abdomen either black with yellowish brown posterior corners on tergites 4–6, or shining brownish. Femora yellowish or dirty brownish. Antennae yellowish, or at least paler on basal segments than on third segment 5

4 Abdomen almost entirely shining blackish. Eye-margins not actually touching on frons (Text-fig. 69) . . . . ***obscura*** ♂ (p. 226)

– Abdomen entirely covered with whitish grey tomentum. Eye-margins almost touching for a short distance on frons (Text-fig. 71) . . ***keiseri*** ♂ (p. 228)

5 Tergites shining black with small whitish grey tomentose posterior corners on tergites 2–3 and yellowish brown non-tomentose posterior corners on tergites 4–6. Third antennal segment yellowish (Text-fig. 78) . . ***rhagioniformis*** ♂ (p. 234)

– Tergites mainly shining brownish, with only small areas of thin tomentum at posterior margins. Third antennal segment blackish, paler at extreme base (Text-fig. 80) . . . . ***minor*** ♂ (p. 238)

6 First three tergites yellowish brown and without tomentum, the following four tergites thickly covered with whitish grey tomentum . . ***distincta*** ♂ (p. 237)

– Without this pattern of tergal colour 7

7 Legs brownish black to black. Abdomen shining blackish with areas of whitish grey tomentum 8

– Legs yellowish brown to brown. Abdomen shining brownish 12

8 Frons and mesonotum seen from in front uniformly whitish grey tomentose, without any pattern. Males 9

– Frons and mesonotum seen from in front not uniformly whitish grey tomentose, as the frons is more or less dark or shining and the mesonotum has a pattern of darker bands. Females 10

9 Frontal width at level of antennae nearly three times as broad as width of frons at anterior ocellus (Text-fig. 73). Posterior margin of epandrium straight (Text-figs 109, 111) . . . . ***angulata*** ♂ (p. 230)

– Frontal width at antennae two times as broad as width of frons at anterior ocellus. Posterior margin of epandrium with dentate processes (Text-figs 118, 120) ***bidentata*** ♂ (p. 232)

10 Ventral setae on f_3 very short, not to be compared in length with the tibial setae, about as long as the whitish, scaly hairs. Dark bands on mesonotum steely black, without a brownish tinge. Terminal spines of ovipositor very slender and pointed . . . . ***angulata*** ♀ (p. 230)

– Ventral setae on f_3 longer, about as long as the shortest tibial setae. Dark bands on mesonotum brownish black 11

11 Terminal spines of ovipositor slightly broadened towards tips which are rounded. Lower part of frons dull brownish black. . . . . . ***keiseri*** ♀ (p. 228)

– Terminal spines of ovipositor very slender and sharply pointed at tips. Lower part of frons subshining blackish . . . . ***obscura*** ♀ (p. 226)

12 Fork of veins R_4 and R_5 situated at level of outer margin of discal cell, cell R_4 thus very long (Text-fig. 88). First and second antennal segments covered with dark

brownish tomentum, thus not distinctly paler than the blackish third antennal segment . . . . **brunnea** ♀ (p. 236)

– Fork of veins R_4 and R_5 situated well beyond level of outer margin of discal cell, cell R_4 thus shorter. First and second antennal segments yellowish brown, much paler than the blackish third antennal segment 13

13 Mesonotum with a distinct black spot in front of *sa* setae. Frons (Text-fig. 70) narrower and with a large dull blackish area below . . **rhagioniformis** ♀ (p. 234)

– Mesonotum uniformly brownish grey in colour. Frons (Text-fig. 68) broader and with a narrow, transverse, dark brownish spot below . . **ostentata** ♂ ♀ (p. 224)

14 Femora yellowish to yellowish brown, always distinctly paler than their respective tibiae 15

– Femora brownish to brownish black, always distinctly darker than their respective tibiae –. 16

15 Cx_1 and cx_2 yellowish, distinctly paler than cx_3. Colour difference between f_3 and t_3 very striking, as femur is bright yellow and tibia black. Axillary cell of female wing not distinctly broader than anal cell . . **variegata** ♂ ♀ (p. 240)

– All coxae of the same colour. Colour difference between f_3 and t_3 not very striking. Axillary cell of female wing distinctly broader than anal cell **fumipennis** ♂ ♀ (p. 242)

16 Frons comparatively broad and gradually widening from level of anterior ocellus. This is very large, its width being about 0.12 mm. First antennal segment shorter (Text-fig. 85). Epandrium of male as in Text-figs 152, 154 **fuscata** ♂ ♀ (p. 242)

– Frons comparatively narrow and of almost equal width on upper part. Anterior ocellus smaller, its width being about 0.08 mm. First antennal segment longer (Text-fig. 86). Epandrium of male as in Text-figs 159, 163 . . **uncilobata** ♂ (p. 244)

THE *KEISERI*-GROUP

The *keiseri*-group includes 9 species all of which are characterized by the short first antennal segment (Text-figs 75–82). This segment is always shorter than the combined lengths of third segment and style. The frontal callus is low, often hardly visible in lateral view (Text-fig. 72). The group is certainly not monophyletic. It includes four species in which the male eyes are touching or almost touching on frons in front of anterior ocellus (Text-figs 69, 71), while the male eyes of the other species are rather broadly separated. Both *ostentata* and *distincta* have strongly apomorphic characters in the male terminalia.

Stenopomyia ostentata sp. n.

(Text-figs 68, 75, 89–93)

DIAGNOSIS. ♂ ♀. A brownish to brownish grey species. Both sexes with a comparatively broad frontal stripe which has a narrow, transverse dull band below. Basal antennal segments paler than third segment. Male terminalia greatly enlarged.

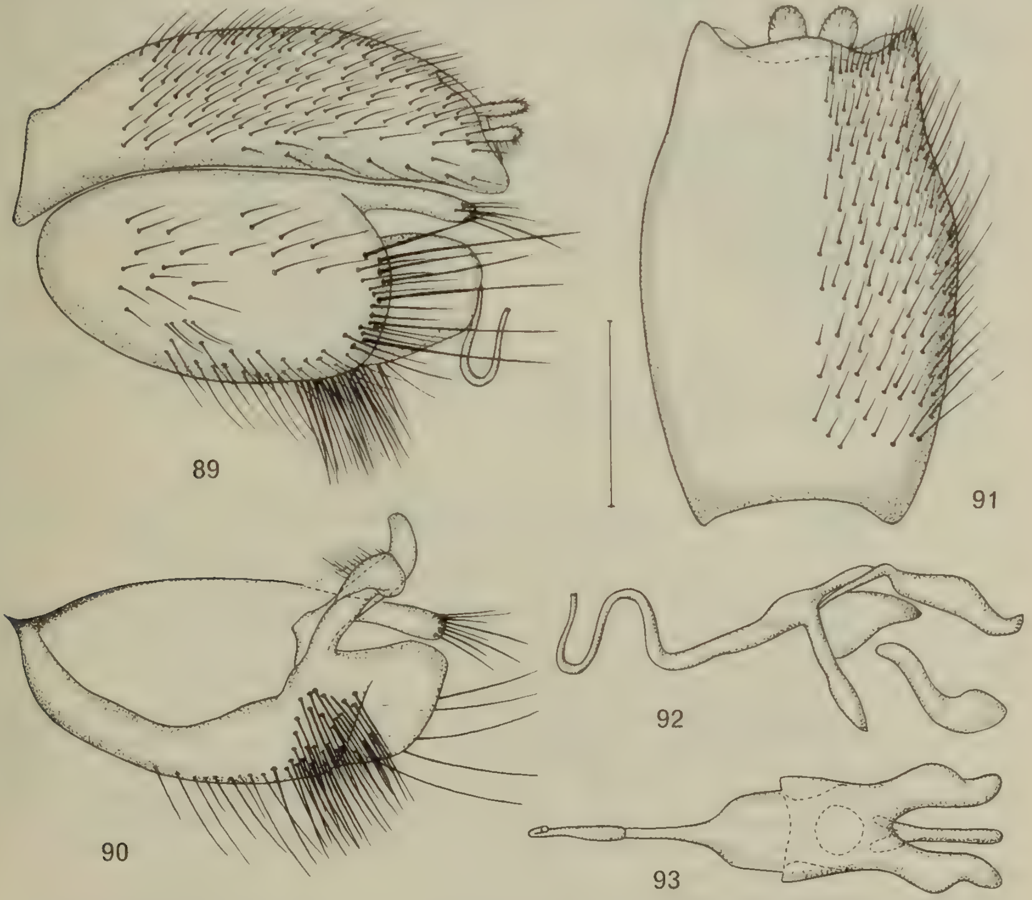
DESCRIPTION. ♂. *Head* (Text-fig. 75). Facial index 0·40. Eyes separated by a comparatively broad frontal stripe. Proboscis reaching only to level of antennal bases; labella very broad. Palpi a little shorter than proboscis, yellowish, with some pale hairs. Frons brownish and brownish grey tomentose, darkest on upper two-thirds and on a narrow band above antennae. Face greyish yellow tomentose. Occiput greyish tomentose below, more brownish grey tomentose above. About 17 post-ocular and occipital setae on each side, the upper post-oculars being long. First, second and base of third antennal segments pale brownish, only thinly tomentose; remainder of third segment and style black. First segment with a few black setae.

Thorax. Mesonotum dull greyish brown, with an indistinct pattern of darker brownish stripes. Mesonotal pile sparse, short and mainly dark. Scutellum paler than mesonotum, 4 *sc* setae, the lateral pair only slightly shorter than the subapical pair. Pleura greyish brown, like the mesonotum, but with a thin whitish tomentum giving a paler appearance. Mesonotum with only a few pale hairs above.

Wings. Cell M_3 widely open. Vein R_4 with the proximal section almost straight, but the distal section with a slight curvature. Colour uniformly brownish. Stigma and veins brownish black. Halteres brownish black.

Legs. F_1 without setae. Left f_2 with a short *pv* seta at apical fourth. F_3 with a short *av* seta at apex and 1–2 even shorter *pv* setae at apex. Colour of legs yellowish brown, apical tarsal segments blackish. Coxae thinly whitish tomentose, like the pleura. Femora very indistinctly tomentose, and femoral pile short, sparse, adpressed and mainly pale. Tibiae appearing darker than femora because of dense short black hairs.

Abdomen. All tergites and sternites shining yellowish brown to dark brownish, being palest on posterior parts. Whitish hind marginal seams distinct on segments 2–4. Pile moderately



FIGS 89–93. Male terminalia of *Stenopomyia ostentata*, holotype. 89, genitalia in lateral view; 90, right gonocoxite in intero-ventral view; 91, epandrium in dorsal view; 92, aedeagus in lateral view; 93, aedeagus in dorsal view. Scale: 0·5 mm.

long, blackish and adpressed on dorsal surface of tergites, whitish and more erect on lateral parts of tergites and on sternites.

Terminalia (Text-figs 89–93). Epandrium and gonocoxites greatly enlarged and shining brownish to brownish black; pile black. Epandrium as in Text-fig. 91. Gonocoxites broadly separated ventrally, their posterior margins broadly rounded and with many long setae. More internally the gonocoxite has a large rounded lobe which projects to near level of posterior margin of epandrium. Ventrally at base this lobe has a tuft of close-set, black, downwardly directed setae. Distal end of dorsal gonocoxal process long and narrow, its apex not reaching to level of posterior corner of epandrium. In ventral view (Text-fig. 90), the stylus appearing as a moderately long rod, gradually decreasing in width towards tip which is curved and blunt. Ventral lobe nearly as long as stylus and of rather complicated shape. Aedeagus very large. Phallus in lateral view (Text-fig. 92) with the proximal part forming a moderately thick tube, which is directed obliquely downwards, and with three strong bends in the distal part which gradually narrows. In dorsal view (Text-fig. 93), with the extreme proximal part rather broad and rapidly narrowing into the long distal part. Dorsal apodeme of rather complicated shape, in dorsal view (Text-fig. 93) with a deep distal cleft. Ventral apodeme directed downwards. Ejaculatory apodeme as in Text-fig. 92. Tergite 8 and sternite 8 not preserved intact in the dissection.

Total length 7·8 mm.

♀. *Head.* Facial index 0·38. Frons (Text-fig. 68) slightly broader above than in male. Otherwise as in male.

Thorax. Colour and chaetotaxy as in male, but right lateral *sc* seta absent.

Wings. Less intensely brownish coloured than in male.

Legs. As described for male, but f_2 without setae and f_3 with 2 *av* setae on left side.

Abdomen. All tergites and sternites of the same shining yellowish brown to dark brownish colour as in male, the anterior parts of the posterior tergites being darkest. 6 + 6 terminal spines which are rather long and thick.

Total length 7·3 mm.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Tan., Ambohitantely, 10.vi.1958 (*Fred Keiser*) (NMB).
Paratype. ♀, same data and depository as holotype.

***Stenopomyia obscura* sp. n.**

(Text-figs 69, 76, 94–101)

DIAGNOSIS. ♂ ♀. A brownish black to blackish species. Abdomen shining in both sexes and with only small areas of tomentum. Male frons very narrow above (Text-fig. 69), female frons subshining black below. Antennae black. Both sexes with some long ventral setae on hind formora. Terminal spines of female abdomen very slender and pointed.

DESCRIPTION. ♂. *Head* (Text-figs 69, 76). Facial index 0·42. Eyes practically touching for a short distance. Proboscis reaching to level of middle of first antennal segment; labella broad and blackish. Palpi much shorter than proboscis, blackish, with pale hairs. Upper frons and central area of lower frons down to antennae dull blackish brown. Lateral areas of lower frons, face, genae and lower occiput whitish to whitish grey tomentose. Upper part of occiput more brownish grey, with about 32 post-ocular and occipital setae on each side. Some of the upper post-oculars very long. Antennae black, first two segments thinly greyish tomentose. Pile short and black.

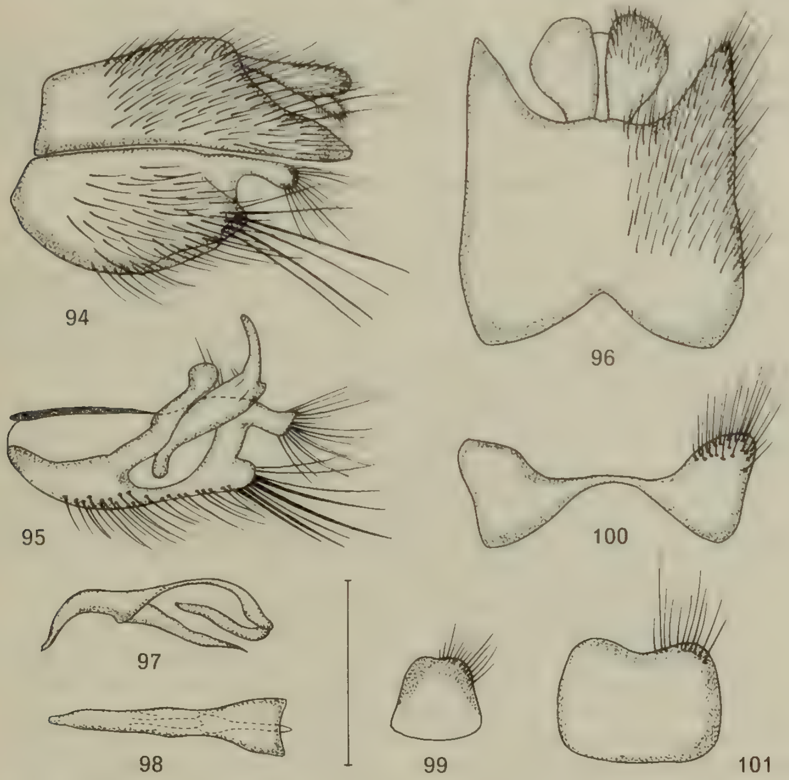
Thorax. Mesonotum almost uniformly brownish black; two indistinct narrow traces of slightly paler stripes. Mesonotal pile moderately long and blackish. Scutellum brownish black, with blackish pile, 4 *sc* setae of almost equal size. Pleura with a dark brownish streak from below wing-base over lower part of mesopleuron to anterior part of sternopleuron. Hypopleuron also mainly dark brownish. Pleura otherwise whitish grey tomentose.

Wings. Cell M_3 widely open. Vein R_4 with proximal section almost straight, distal section with a moderately deep curvature. Colour brownish grey, most intensely on anterior part. Stigma and veins blackish brown. Halteres blackish.

Legs. F_1 and f_2 without setae. F_3 with 3 rather long *av* setae and a similar number of shorter *pv* setae, all situated in apical half. Coxae whitish grey tomentose. Femora, tibiae and tarsi blackish brown to blackish. Femoral pile consisting of both whitish and blackish hairs. Claws and pulvilli normal.

Abdomen. All tergites shining blackish, with small areas of whitish grey tomentum situated as follows: lateral parts of tergite 1, postero-lateral corners of tergites 2–3, and small lateral spots on tergites 5–6. Pile moderately long and mainly black, only pale on lateral areas of tergites 1–3. Sternites shining blackish brown.

Terminalia (Text-figs 94–101). Epandrium and gonocoxites shining blackish and with blackish pile. Epandrium as in Text-fig. 96. Paraproct as in Text-fig. 99. No sclerotization of the intersegmental membrane. Gonocoxite (Text-fig. 94) much shorter than epandrium; its lower, posterior corner rounded and with some long strong setae. More dorsally the gonocoxite forming a flat lobe with a comparatively short and broad dorsal gonocoxal process which does not reach to level of posterior corners of epandrium. Proximal part of stylus



FIGS 94–101. Male terminalia of *Stenopomyia obscura*, holotype. 94, genitalia in lateral view; 95, right gonocoxite in intero-ventral view; 96, epandrium in dorsal view; 97, aedeagus in lateral view; 98, aedeagus in dorsal view; 99, paraproct; 100, tergite 8; 101, sternite 8. Scale: 0·5 mm.

(Text-fig. 95) rather narrow and suddenly constricted into a still narrower and slightly curved tip. Ventral lobe comparatively narrow, rounded at tip. Phallus in lateral view (Text-fig. 97) comparatively thick proximally, gradually narrowing and downcurved; in dorsal view (Text-fig. 98), of almost equal width throughout. Dorsal apodeme in lateral view (Text-fig. 97) comparatively short and downcurved, in dorsal view (Text-fig. 98) of equal width in proximal part and gradually widening in distal part. Ventral apodeme comparatively long, but narrow. Ejaculatory apodeme short and simple. Tergite 8: Text-fig. 100. Sternite 8: Text-fig. 101.

Total length 7·8 mm.

♀. *Head.* Facial index 0·46. Proboscis and palpi as in male, though labella may be somewhat larger. Frons mainly blackish, shining and wrinkled. Lateral areas of upper part a little brownish tomentose. Lateral areas of lower part of frons and rest of head, including antennae, as described for male, though upper post-oculars are shorter.

Thorax. Mesonotum with the two narrow, pale stripes a little more distinct than in male. Otherwise all characters of thorax as described for male.

Wings. Colour more intensely brownish than in male. Other characters as in male.

Legs. As described for male.

Abdomen. There is no sexual difference in the colour of tergites and sternites, which is unusual in Therevidae, but the pile is shorter. 5 + 5 terminal spines which are moderately long but very thin and sharply pointed.

Total length 8·0 mm.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Fia., Vohiparara, 13.ix.1958 (*Fred Keiser*) (NMB).
Paratypes. Same locality as holotype, 2 ♀, 15.ix.1958 (*Fred Keiser*) (NMB).

***Stenopomyia keiseri* sp. n.**

(Text-figs 71, 72, 81, 102–108)

DIAGNOSIS. ♂ ♀. A brownish black to blackish species. In certain views, male abdomen entirely covered with whitish grey tomentum; female abdomen shining with small areas of tomentum. Eye-margins touching on male frons (Text-fig. 71). Female frons with a large, dull brownish area on lower part. Both sexes with some long setae on hind femora. Terminal spines at apex of female abdomen broadened towards tips.

DESCRIPTION. ♂. *Head* (Text-figs 71, 72, 81). Facial index 0·44. Eyes practically touching for a short distance. Proboscis reaching to level of middle of first antennal segment; labella broad and blackish. Palpi much shorter than proboscis, blackish, with thin greyish tomentum and short pale hairs. Most of frons brownish tomentose. Lower part of frons, face, genae and occiput whitish grey tomentose. Upper part of occiput with about 22 post-ocular and occipital setae on each side. Antennae blackish, first and second segments only thinly tomentose. Pile short and black.

Thorax. Mesonotum mainly brownish black, subshining, with two narrow, greyish stripes which are widely separated. Mesonotal pile moderately long and blackish. Scutellum brownish black on disc, slightly paler greyish brown along margin; its pile long and black, 4 *sc* setae of almost equal size. Pleura rather thickly whitish grey tomentose, lower half of mesopleuron and anterior part of sternopleuron more brownish.

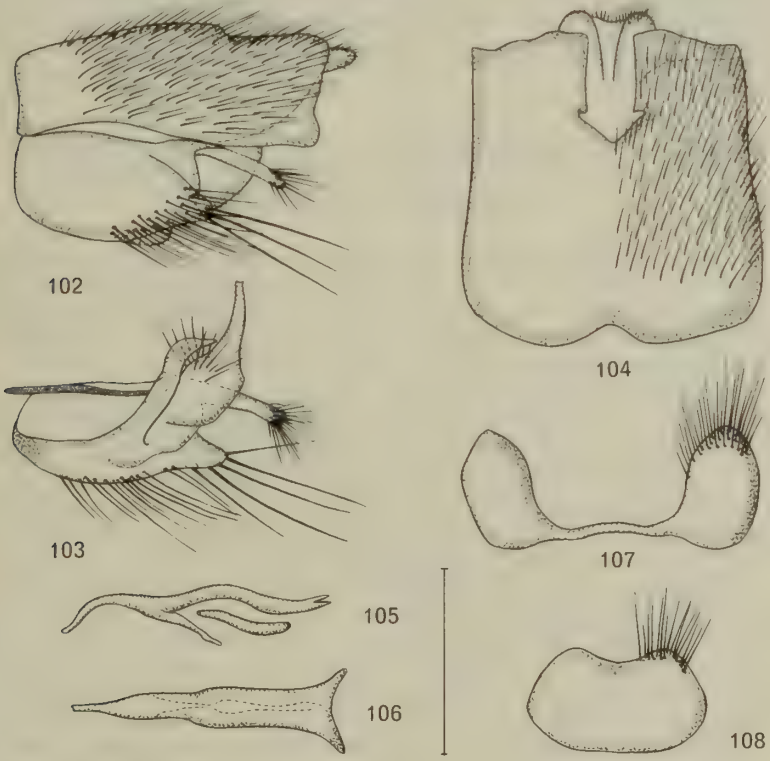
Wings. Cell M_3 narrowly open or closed at wing-margin. Vein R_4 with proximal section nearly straight, distal section with a moderately deep curvature. Colour almost uniformly brownish, though less intensely in basal part. Stigma darker brownish than rest of wing. Veins and halteres blackish.

Legs. F_1 with 1–3 *av* setae. F_2 with 1 *av* seta. F_3 with 2–3 rather long *av* setae and similar number of shorter *pv* setae, all situated in apical third. Coxae whitish grey tomentose like the pleura. Femora blackish, only very thinly tomentose. Pile on posterior surfaces of f_1 and

f_2 moderately long and whitish; shorter and more adpressed and dark on the other surfaces. Tibiae and tarsi dark brownish to brownish black, t_3 and tarsi being darkest.

Abdomen. All tergites thickly whitish grey tomentose, only extreme lateral margins of tergites 4–7 without tomentum and shining. Pile moderately long and whitish, but black on lateral parts of tergites 4–6 and also on disc of tergite 7. Whitish hind-marginal seams distinct on tergites 2–4. Sternites blackish brown and shining. Pile whitish on sternites 1–3, blackish on the rest.

Terminalia (Text-figs 102–108). Epandrium and gonocoxites shining blackish with black pile. Epandrium as in Text-fig. 104. Gonocoxite (Text-fig. 102) much shorter than epandrium; its lower, posterior corner rounded and with some long and strong setae. More dorsally the gonocoxite, forming a flat lobe, carries the narrow and comparatively long distal end of dorsal gonocoxal process which does not reach to level of posterior margin of epandrium. Proximal part of stylus very thick and clearly visible in both lateral (Text-fig. 102) and ventral (Text-fig. 103) views. Stylus rather abruptly narrowing into a slender distal part. Ventral lobe comparatively narrow, rather long, its tip curved. Phallus in lateral view (Text-fig. 105) forming a rather long, narrow and gradually curved tube, which in dorsal view (Text-fig. 106) is about thrice as wide proximally as distally. Dorsal apodeme (Text-fig. 105) in lateral view with two bends, in dorsal view (Text-fig. 106) of equal width for a long distance; distal part



FIGS 102–108. Male terminalia of *Stenopomyia keiseri*, holotype. 102, genitalia in lateral view; 103, right gonocoxite in intero-ventral view; 104, epandrium in dorsal view; 105, aedeagus in lateral view; 106, aedeagus in dorsal view; 107, tergite 8; 108, sternite 8. Scale: 0·5 mm.

with two narrow projections. Ventral apodeme short and narrow. Ejaculatory apodeme short and simple. Tergite 8: Text-fig. 107. Sternite 8: Text-fig. 108.

Total length 6·7–8·2 mm.

♀. *Head.* Facial index 0·46. Frons with lower half dull brownish black to near antennal bases; upper half more greyish tomentose though still dark. Other characters as in male.

Thorax. Colour and pile practically as in male, though the two narrow, greyish stripes on mesonotum are broader and more diffusely demarcated, and the pile is shorter.

Wings. Cell M_3 open in both specimens. Colour much paler than in male, greyish hyaline with brownish black stigma and veins.

Legs. As described for male.

Abdomen. Tergites shining blackish, with the following areas thinly whitish grey tomentose: lateral parts of tergite 1, postero-lateral corners of tergites 2–3, and lateral parts of tergites 5–6. Pile short and blackish, only whitish on tomentose areas of tergites 1–3. Sternites as in male. 5 + 5 terminal spines which are moderately long, broader towards apex and blunt-tipped.

Total length 7·8–8·8 mm.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Tam., Perinet, 5.x.1958 (*Fred Keiser*) (NMB).

Paratypes. MADAGASCAR: Tam., Perinet, 3 ♂, 26.ix.–5.x.1958 (*Fred Keiser*); Tam., Moramanga, 1 ♂, 9.x.1958 (*Fred Keiser*); Fia., Vohiparara, 1 ♂, 1 ♀, 12 & 15.ix.1958 (*Fred Keiser*); Fia., Ambatolahy, 1 ♀, 14.ix.1958 (*Fred Keiser*). 2 ♂ and 1 ♀ paratypes in ZMC, other paratypes in NMB.

Stenopomyia angulata **sp. n.**

(Text-figs 73, 82, 109–117)

DIAGNOSIS. ♂♀. A blackish species. Seen from in front, male with whitish grey tomentum on frons, mesonotum and most of abdomen. Male frons rather wide above (Text-fig. 73). Both sexes with blackish antennae and very short ventral setae on hind femora. Terminal spines at tip of female abdomen very thin and pointed. Female mesonotal bands steely black, not brownish black as in *keiseri* and *obscura*.

DESCRIPTION. ♂. *Head* (Text-figs 73, 82). Facial index 0·41. Eyes well-separated, a comparatively wide frontal stripe present. Proboscis reaching to level of about middle of first antennal segment; labella broad. Palpi much shorter than proboscis, greyish black, with short pale hairs. Frons, face and genae silvery whitish grey tomentose. Lower part of occiput whitish grey tomentose and with long, whitish hairs. Upper part of occiput more subshining blackish, with about 18 post-ocular + occipital setae on each side. Antennae blackish, first and second segments with thin greyish tomentum; pile short and black.

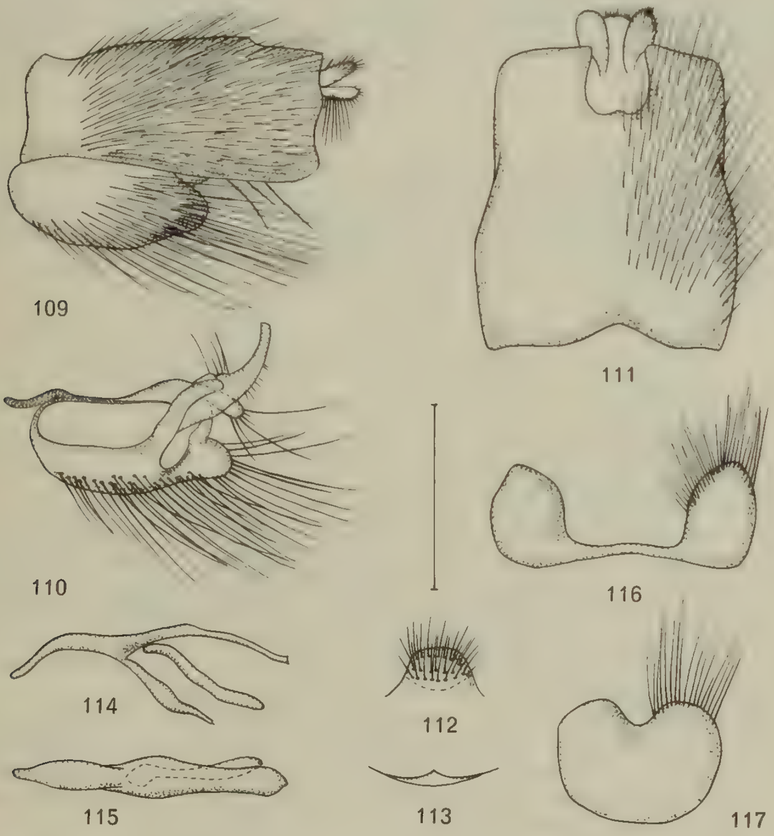
Thorax. When seen from in front, mesonotum appearing whitish grey tomentose. Seen from behind, mesonotum subshining blackish with two narrow stripes of whitish grey tomentum. Mesonotal pile rather short (0·10–0·12 mm) and consisting of both whitish and blackish hairs in variable ratios. Scutellum with the same pattern and pile as mesonotum; with 4 *sc* setae, of which the lateral pair is distinctly shorter than the subapical pair or totally absent. Pleura appearing dark in lateral view, whitish grey tomentose in dorsal view.

Wings. Cell M_3 open. Vein R_4 with proximal section almost straight, distal section with a deep curvature. Colour greyish brown, most intensely in apical half. Stigma and veins blackish brown. Halteres blackish.

Legs. Femora without setae comparable in length with the tibial setae, but with very short, spine-like setae on ventral surface, more or less distinctly arranged into anteroventral and posteroventral rows. Coxae intensely whitish grey tomentose. Femora blackish, not dulled by tomentum, but with whitish scaly hairs, especially on posterior surfaces; also with erect blackish hairs. Tibiae and tarsi also blackish.

Abdomen. Seen from in front, tergites 1–6 appearing whitish grey tomentose with posterior corners of tergite 4 blackish. Seen from behind with the central area and anterior half of the lateral areas of tergites 1–3 deep black, and posterior half of lateral areas whitish grey tomentose. Tergite 4 entirely deep black. Tergites 5–6 whitish grey, with large areas on middle shaped like hour-glasses and deep blackish. Tergite 7 black. Whitish hind-marginal seams distinct on tergites 2–5. Pile rather long and adpressed, whitish on tergites 1–3, except on anterior parts of lateral areas of tergites 2–3 where it is blackish. The following tergites mainly blackish haired, but with many whitish hairs intermixed on the central area of tergites 4–6. Sternites blackish, only very thinly tomentose. Pile of sternites 1–3 whitish, of sternites 4–7 black.

Terminalia (Text-figs 109–117). Epandrium and gonocoxites shining blackish with black pile. Epandrium as in Text-fig. 111. Paraproct forming a small, weak sclerite (Text-fig. 112) which is not connected with sclerotized areas on the intersegmental membrane. Gonocoxite (Text-fig. 109) small in comparison with epandrium and with an evenly rounded posterior margin; distal end of dorsal gonocoxal process short. Stylus comparatively long and narrow,



FIGS 109–117. Male terminalia of *Stenopomyia angulata*, holotype. 109, genitalia in lateral view; 110, right gonocoxite in intero-ventral view; 111, epandrium in dorsal view; 112, paraproct; 113, hypandrium; 114, aedeagus in lateral view; 115, aedeagus in dorsal view; 116, tergite 8; 117, sternite 8. Scale: 0·5 mm.

as is also the ventral lobe. Hypandrium (Text-fig. 113) short and narrow. Phallus in lateral view (Text-fig. 114) forming a rather long and gradually curved tube, in dorsal view (Text-fig. 115) widest at middle. Dorsal apodeme (Text-fig. 114) gradually curved and in dorsal view (Text-fig. 115) very narrow. Ventral apodeme also narrow. Ejaculatory apodeme rather long and simple. Tergite 8: Text-fig. 116. Sternite 8: Text-fig. 117.

Total length 7·8–8·6 mm.

♀. *Head.* Facial index 0·40. Frons and face a little broader than in male. Frons in dorsal view distinctly tomentose, in frontal view subshining blackish except for lower part. Other characters as in male.

Thorax. When seen from in front, mesonotum appearing blackish grey and subshining with two narrow, broadly separated, whitish grey tomentose stripes. When seen from behind, the stripes are still visible and the rest of mesonotum is deeper blackish and shining. Pile shorter than in male and entirely blackish. Scutellum and pleura as in male.

Wings and legs as described for male.

Abdomen. Tergites 1–3 shining blackish with lateral parts of tergite 1 and posterior corners of tergites 2–3 whitish grey tomentose. Tergite 4 entirely shining blackish. Tergites 5–6 whitish grey tomentose, with large blackish areas on middle shaped like hour-glasses. Remainder of abdomen shining blackish. Pile mainly blackish and rather short, only whitish on lateral and posterior part of tergite 1, along posterior margin of tergites 2–3, and on whitish grey areas of tergites 2–3. 6 + 6 terminal spines which are short, very slender and pointed.

Total length 8·5–9·8 mm.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Tam., Perinet, 25.ix.1958 (*Fred Keiser*) (NMB).

Paratypes. MADAGASCAR: Tam., Perinet, 22 ♂, 16 ♀, 22.ix.–5.x.1958 (*Fred Keiser*) (NMB & ZMC); Tam., Moramanga, 1 ♂, 9.x.1958 (*Fred Keiser*) (NMB); Fia., Vohiparara, 5 ♂, 1 ♀, 12–13.ix.1958 (*Fred Keiser*) (NMB & ZMC).

***Stenopomyia bidentata* sp. n.**

(Text-figs 77, 118–124)

DIAGNOSIS. ♂. Very similar to the male of *angulata*, but smaller and frontal stripe less strongly widening towards level of antennae.

♀. Difficult to distinguish from the female of *angulata* (see below).

DESCRIPTION. ♂. *Head* (Text-fig. 77). Eyes well separated: a comparatively broad frontal stripe present. Facial index 0·39. Proboscis reaching to level of about middle of first antennal segment; labella broad. Palpi much shorter than proboscis, slender and blackish, pile very sparse. Frons, face and genae silvery whitish grey tomentose. Lower part of occiput whitish grey tomentose and with long, whitish hairs. Upper part of occiput more dark greyish, with only 8–10 post-ocular + occipital setae on each side. Antennae blackish, first and second segments slightly tomentose, pile short and black.

Thorax. When seen from in front, mesonotum appearing very intensely whitish grey tomentose, without any pattern. Seen from behind, mesonotum subshining blackish with two narrow, whitish grey stripes in front. Mesonotal pile short and whitish. Scutellum with same pattern and pile as mesonotum. Only 2 *sc* setae but an additional short, lateral seta present on one side in the paratype. Pleura whitish grey tomentose.

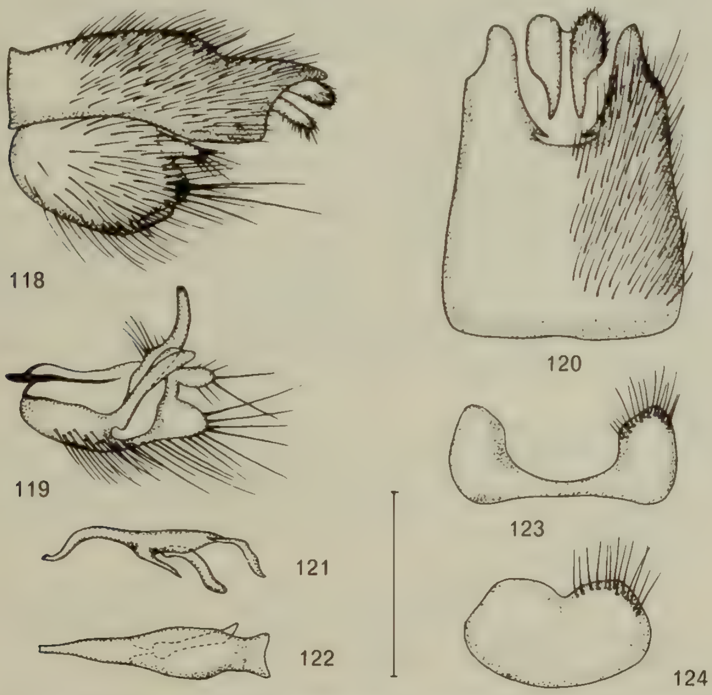
Wings. Cell M_3 open. Vein R_4 with proximal section almost straight, apical section with a deep curvature. Colour greyish hyaline in proximal half, brownish grey in distal half, but without any distinct line of demarcation. Stigma and veins brownish black. Halteres blackish.

Legs. Femora without long ventral setae, with only very short setulose hairs on ventral surfaces, especially on f_3. Coxae whitish grey tomentose. Femora blackish brown, not dulled by tomentum, with short whitish pile and some of the hairs on posterior surface of femora scaly. Tibiae and tarsi blackish brown.

Abdomen. Seen from in front, tergites 2–3 shining blackish on anterior two-thirds and whitish grey tomentose on posterior third; tergite 1 shining blackish medially and whitish grey laterally. Tergite 4 entirely shining blackish, and tergites 5–6 entirely whitish grey tomentose. Seen from behind, tergites 2–3 blackish on middle down to hind-margin, so that only posterior half of lateral areas is whitish grey tomentose. Tergite 4 still shining blackish, and tergites 5–6 with dark areas on middle shaped like hour-glasses. Tergite 7 black. Pile rather long and black on black areas, whitish on tomentose areas. Hind-marginal seams distinct on tergites 2–3. Sternites blackish with posterior parts of sternites 2–3 slightly tomentose. Pile whitish on sternites 1–3, blackish on the rest.

Terminalia (Text-figs 118–124). Epandrium and gonocoxites shining blackish with black pile. Epandrium as in Text-fig. 120. Gonocoxite (Text-fig. 118) small, with rounded posterior margin. Distal end of dorsal gonocoxal process projecting slightly above level of posterior margin of epandrium. Stylus (Text-fig. 119) long and narrow. Ventral lobe long and broad. In lateral view phallus (Text-fig. 121) forming a rather long, curved tube, which in dorsal view (Text-fig. 122) is narrow proximally and slightly narrowed towards tip. Dorsal apodeme (Text-fig. 121) rather short, distal part downcurved, in dorsal view (Text-fig. 122) twice as broad as proximal part of phallus. Both ventral and ejaculatory apodemes comparatively reduced. Tergite 8: Text-fig. 123. Sternite 8: Text-fig. 124.

Total length 6·1–6·4 mm.



FIGS 118–124. Male terminalia of *Stenopomyia bidentata*, holotype. 118, genitalia in lateral view; 119, right gonocoxite in intero-ventral view; 120, epandrium in dorsal view; 121, aedeagus in lateral view; 122, aedeagus in dorsal view; 123, tergite 8; 124, sternite 8. Scale: 0·5 mm.

♀. Very similar to female of *angulata* (see above). Facial index 0·40. As in male, lower frons and face narrower, and third antennal segment and style shorter (cf. Text-figs 77, 82).
Total length 8·5 mm.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: D.-S., Joffreville, 13.v.1958 (*Fred Keiser*) (NMB).
Paratypes. Same locality as holotype, 1 ♂, 1 ♀, 13 & 25.v.1958 (*Fred Keiser*) (NMB & ZMC).

Stenopomyia rhagioniformis sp. n.

(Text-figs 70, 78, 125–131)

DIAGNOSIS. ♂. Easily recognized in the group by the combination of contiguous eyes, yellowish antennae and legs, and tergites shining black to yellowish brown with only small areas of tomentum.

♀. Abdomen completely shining brownish yellow and a black mesonotal spot in front of supraalar setae.

DESCRIPTION. ♂. *Head* (Text-fig. 78). Facial index 0·34. Eyes practically touching for rather a long distance. Proboscis reaching to level of middle of first antennal segment; labella broad and yellowish. Palpi much shorter than proboscis, slender, yellowish and with short pale hairs. Frons, face, genae and occiput whitish grey tomentose, only extreme dorsal part of occiput brownish grey tomentose, and also upper part of frons darkened. Upper part of occiput with about 20 post-ocular and occipital setae on each side; some of the upper post-oculars long. First, second and base of third antennal segment yellowish and hardly tomentose; rest of third segment becoming gradually darker towards tip; style entirely black. Pile short and black.

Thorax. Mesonotum with three brownish bands which are dulled by greyish tomentum but are still subshining. Two narrow and broadly separated stripes of yellowish grey tomentum. Posterior and lateral parts distinctly whitish grey tomentose. Mesonotal pile moderately long and dark. Disc of scutellum of the same colour as mesonotum, margin broadly yellowish brown; its pile dark. Number of scutellar setae not constant: 4 *sc* setae are present in only 3 specimens, whilst only 3 *sc* setae are present in five specimens, including the holotype, as the lateral seta is absent on left or right side. In five specimens, only the subapical pair is present. Pleura evenly and rather intensely whitish grey tomentose.

Wings. Cell M_3 open. Vein R_4 with proximal section almost straight, apical section with a moderately deep curvature. Colour greyish brown. Stigma brownish. Veins blackish. Halteres brownish.

Legs. F_1 with a single *av* seta near middle. F_2 without setae. F_3 with 1–2 moderately long *av* setae near tip, and a row of about 5 shorter *pv* setae in apical half. Cx_1 and cx_2 yellowish, cx_3 brownish; all coxae thinly whitish grey tomentose. Femora yellowish, their pile short, very sparse and mainly pale; some dark, scaly hairs present on posterior and dorsal surfaces of f_3. Tibiae appearing darker than femora, but this mainly due to dense pile consisting of short, black hairs. Tarsi mainly blackish.

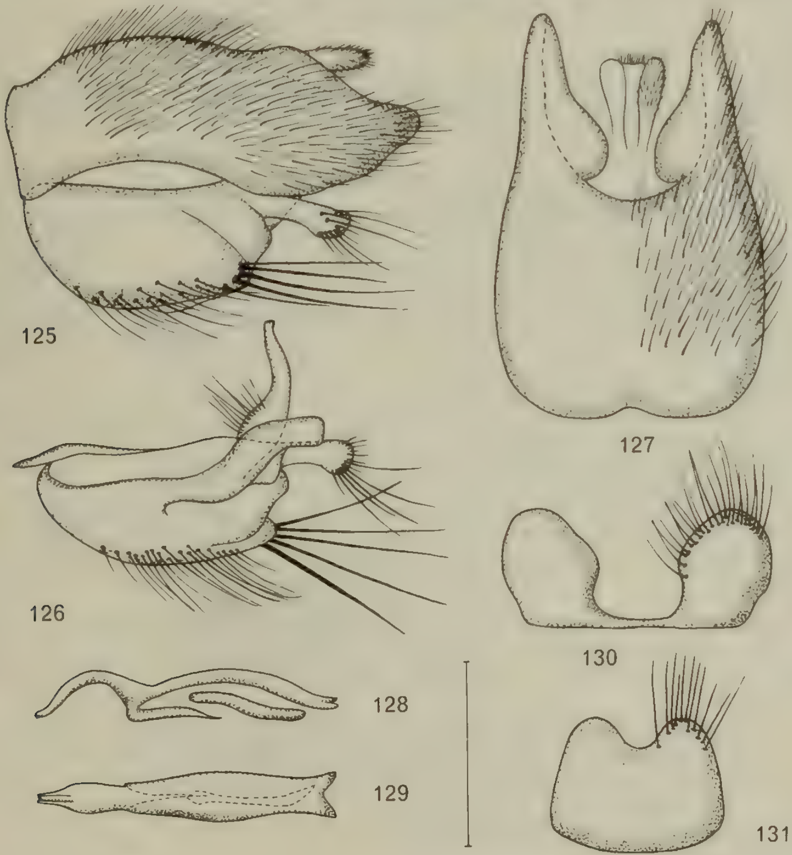
Abdomen. Tergite 1 mainly whitish grey tomentose, only darker on middle of anterior part. Anterior part of tergites 2–3 yellowish brown in varying degrees, sometimes very indistinctly so; remainder blackish to brownish and shining; on postero-lateral corners with a small area of whitish grey tomentum. Tergites 4–6 blackish brown to blackish and shining on dorsal surfaces; posterior and lateral areas yellowish brown in varying degrees. In dorsal view, often only a narrow stripe yellowish brown, but in some specimens a broader area on the posterior part yellowish brown; extreme lateral areas of these tergites always yellowish brown. Sternites yellowish brown, with more or less distinct blackish areas on middle. Pile on lateral parts of tergites 1–3 and of sternites 1–3 whitish, on rest of abdomen black.

Terminalia (Text-figs 125–131). Epandrium and gonocoxites shining blackish with black pile. Epandrium as in Text-fig. 127. Gonocoxite (Text-fig. 125) much shorter than epandrium; its lower, posterior corner rounded and with some long and strong setae. More dorsally, the gonocoxite forming a flat lobe bearing the broad distal end of the dorsal gonocoxal process, which does not reach to level of posterior corner of epandrium. In ventral view (Text-fig. 126) the very long and narrow stylus appears. Ventral lobe large. Phallus in lateral view (Text-fig. 128) narrow and gradually curved, in dorsal view (Text-fig. 129) rather thick. Dorsal apodeme in lateral view long and gradually curved, in dorsal view of almost equal width throughout. Ventral apodeme short and narrow. Ejaculatory apodeme simple. Tergite 8: Text-fig. 130. Sternite 8: Text-fig. 131.

Total length 6·2–8·9 mm.

♀. *Head* (Text-fig. 70). Facial index 0·36. Frons moderately broad; on lower part with a dull black area. Remainder of frons covered with greyish brown tomentum. Other characters as in male.

Thorax. Disc of mesonotum practically as in male, but lateral parts appearing paler, i.e. more translucent yellowish brown, and in front of supraalar setae with a well-marked black



FIGS 125–131. Male terminalia of *Stenopomyia rhagioniformis*, holotype. 125, genitalia in lateral view; 126, right gonocoxite in intero-ventral view; 127, epandrium in dorsal view; 128, aedeagus in lateral view; 129, aedeagus in dorsal view; 130, tergite 8; 131, sternite 8. Scale: 0·5 mm.

spot. Scutellum and pleura also appearing yellowish brown, with only a thin layer of whitish tomentum.

Wings and *legs* as in male.

Abdomen practically all yellowish brown, shining, with small triangular areas of whitish tomentum at posterior corners of tergites 1–3. Tergites 6–7 more or less blackish. Pile very short and sparse. Terminal spines of ovipositor moderately long and sharply pointed.

Total length 7·8–9·6 mm.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: D.-S., Joffreville, 9.v.1958 (*Fred Keiser*) (NMB).

Paratypes. MADAGASCAR: D.-S., Joffreville, 12 ♂, 18 ♀, 8.–25.v.1958 (*Fred Keiser*) (NMB and ZMC).

***Stenopomyia brunnea* sp. n.**

(Text-figs 79, 88)

DIAGNOSIS. ♂. Unknown.

♀. A brownish species with mesonotum evenly covered with dark brownish grey tomentum. Antennae dark brownish to blackish and fork of R_4 and R_5 situated at level of outer margin of discal cell.

DESCRIPTION. ♂. Unknown.

♀. *Head* (Text-fig. 79). Facial index 0·41. Proboscis reaching to level of middle of first antennal segment. Palpi much shorter than proboscis, narrow, brownish grey and with a few pale hairs. Frons discoloured in the holotype, but apparently dull brownish with a narrow band of a deeper brownish colour above antennal bases, without hairs. Face short and genae very narrow, both greyish brown. Lower part of occiput greyish tomentose. Upper part of occiput brownish grey tomentose and with 18 post-ocular and occipital setae on each side. The upper post-oculars long. Antennae blackish, first and second segments with slight greyish brown tomentum, pile of first segment short and blackish.

Thorax. Mesonotum dull, dark brownish grey, with a narrow darker brownish stripe along mid-line, and with traces of darker bands laterally. Pile short, adpressed and yellowish. Scutellum of the same colour as mesonotum; 4 *sc* setae, lateral pair about two-thirds as long as sub-apical pair. Pleura also brownish grey, but thinly whitish tomentose.

Wings (Text-fig. 88). Cell M_3 broadly open. Vein R_4 with proximal section long and straight, apical section evenly downcurved. Cell R_4 very long and narrow, arising at level of outer margin of discal cell. Colour greyish hyaline. Stigma and veins brownish black. Halteres brownish black.

Legs. F_1 and f_2 without setae. F_3 with 2 short *av* and 2 even shorter *pv* setae, all situated on apical third. Coxae coloured like the pleura. Femora, tibiae and tarsi yellowish brown, apical tarsal segments blackish. Femoral pile short and mainly whitish and scaly. Claws and pulvilli normal.

Abdomen. All tergites shining brownish black on anterior parts, more yellowish brown on posterior parts and laterally; the lines of demarcation between the darker and paler areas not very sharp. Sternites yellowish brown. Segments 2–4 with whitish hind-marginal seams. Pile on first three tergites pale and adpressed, on the following tergites blackish and erect. 8 + 8 terminal spines which are short and rather thick.

Total length 7·3 mm.

REMARKS. There is a second female specimen dating from 8.vi.1958 and collected at the same locality as the holotype. It differs in a few characters from the holotype: the mesonotum has a broader, dark brownish band along mid-line, the wings are darker and the curvature of vein R_4 is different, the abdomen is much more distinctly banded into blackish brown and yellowish brown areas, and only 6 + 6 terminal spines are present. As the possibility cannot be excluded that this specimen represents a species distinct from *brunnea*, it has not been labelled as a paratype.

Material examined.

Holotype ♀, Madagascar: Tan., Ambohitantely, 9.vi.1958 (*Fred Keiser*) (NMB).

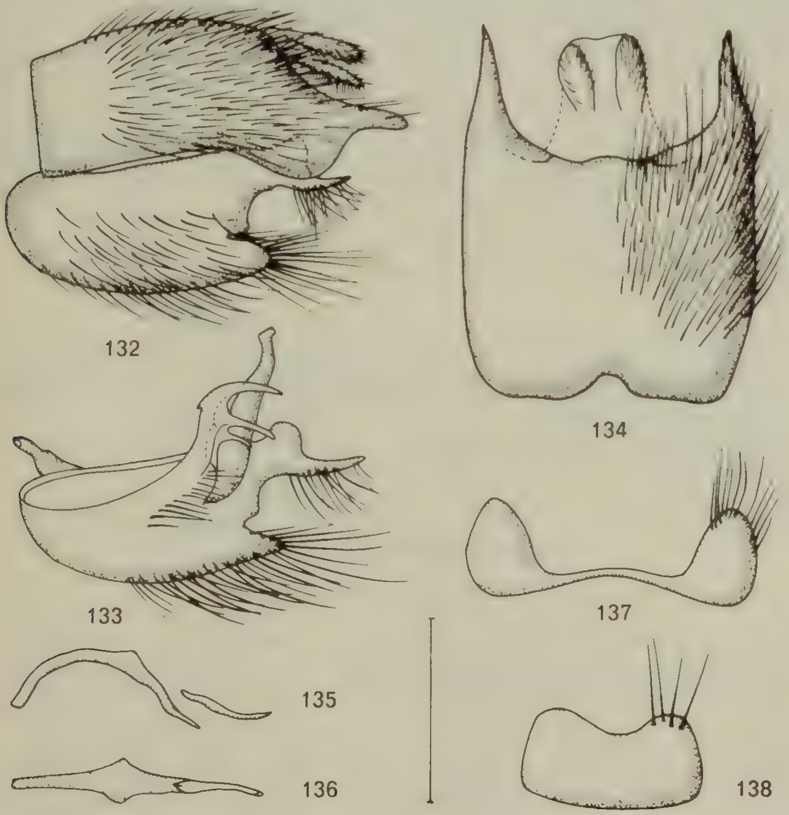
***Stenopomyia distincta* sp. n.**

(Text-figs 132–138)

Diagnosis. ♂. Easily distinguished from all other species of the genus by the differently coloured abdominal tergites. Eyes well-separated. F_3 yellowish, t_3 blackish.

♀. Unknown.

Description. ♂. *Head.* Facial index 0·32. Eyes separated by a narrow frontal stripe.



Figs 132–138. Male terminalia of *Stenopomyia distincta*, holotype. 132, genitalia in lateral view; 133, right gonocoxite in intero-ventral view; 134, epandrium in dorsal view; 135, aedeagus in lateral view; 136, aedeagus in dorsal view; 137, tergite 8; 138, sternite 8. Scale: 0·5 mm.

Proboscis reaching to level of middle of first antennal segment and yellowish brown, like the much shorter palpi. Palpal pile short and pale. Frons seen from in front mainly dull black, narrowly silvery whitish tomentose above antennal bases. Seen from above, upper part of frons with greyish brown tomentum. Lower part of occiput silvery greyish tomentose, upper part more brownish grey tomentose. About 18 long post-ocular and occipital setae on each side. First and second antennal segments yellowish. Third antennal segment missing in holotype, in paratype yellowish brown at base but otherwise black (as in *brunnea*, Text-fig. 79).

Thorax. All parts yellowish brown and shining, pleura with very thin whitish tomentum. 4 strong *sc* setae.

Wings. Cell M_3 broadly open. Vein R_4 with a low curvature in proximal section, apical section with a moderately deep curvature. Colour brownish grey tinged, with brownish black stigma and veins. Halteres yellowish brown.

Legs. F_1 with 1–2 *av* setae. F_2 without setae. F_3 with a few *av* and *pv* setae at apex. Coxae and femora yellowish brown, f_3 slightly darkened at apex. Femoral pile very short and pale. T_1 and t_2 also brownish in colour but t_3 more blackish. All tibiae appearing darker because of dense, black pile. Tarsi darkened.

Abdomen. Tergites 1–2 and most of tergite 3 yellowish brown and shining. Tergites 4–7 with a thick covering of whitish grey tomentum. Postero-median area of tergite 3 also darkened by similar tomentum. Sternites 1–5 yellowish brown, rest of sternites darkened. Pile sparse, short and pale except on posterior sternites, where it is blackish.

Terminalia (Text-figs 132–138). Epandrium and gonocoxites shining blackish brown with black pile. Epandrium as in Text-fig. 134. Gonocoxite (Text-fig. 132) with a moderately long process ventrally. Distal end of dorsal gonocoxal process broadly looped proximally, ending in a sharply pointed tip. Ventral lobe (Text-fig. 133) very remarkable in shape, provided with three antler-like processes on apical posterior surface. Stylus long, gradually decreasing in width towards tip. Aedeagus with dorsal apodeme totally reduced. Phallic part rather long and gently curved. Entire aedeagus weakly sclerotized and pigmented. Tergite 8 as in Text-fig. 137. Sternite 8 as in Text-fig. 138.

Total length about 7·5 mm.

♀. Unknown.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Tulear Pr., Zombitsy Forest, 300 m, 22.iii.1968 (*K. M. Guichard & P. D.*). (BMNH).

Paratype. 1 ♂, same data as holotype.

Stenopomyia minor **sp. n.**

(Text-figs 80, 139–144)

DIAGNOSIS. ♂. A small, brownish black species with mainly shining abdomen, and mesonotum dulled by dark brownish tomentum. Eyes almost touching on frons for a short distance. Femora dirty brownish in colour.

♀. Unknown.

DESCRIPTION. ♂. *Head* (Text-fig. 80). Facial index 0·41. Eyes practically touching for a short distance. Proboscis reaching only to level of antennal base. Proboscis and the much shorter palpi dark brownish and with mainly pale hairs. Frons mostly dark brownish to brownish grey tomentose. Face, genae and lower part of occiput silvery whitish tomentose. Upper part of occiput brownish grey tomentose, with about 22 long post-ocular and occipital setae on each side. First, second and base of third antennal segment dark brownish and thinly whitish tomentose; rest of third segment and style black. Pile comparatively long and black.

Thorax. Mesonotum almost uniformly dark brownish and dull, with two indistinct paler brownish stripes. Mesonotal pile short and black. Scutellum coloured like the mesonotum, with 4 *sc* setae, the lateral pair shorter and weaker than the subapical pair. Pleura with a thin layer of whitish tomentum, upper part of mesopleuron slightly brownish.

Wings. Cell M_3 broadly open. Vein R_4 with only a slight curve on middle section. Colour uniformly greyish brown. Stigma, veins and halteres brownish black.

Legs. F_1 and f_2 without setae. F_3 with a single *av* and *pv* seta near tip. Legs almost uniformly dirty yellowish brown to brown. Pile on femora and tibiae mostly blackish.

Abdomen. Almost uniformly brownish to brownish black and shining. Tergites without any distinctly marked pattern, but lateral areas appearing paler. Small areas of whitish tomentum at postero-lateral corners of tergites 1–2 and 4–5. Pile short and sparse, consisting of both blackish and pale hairs.

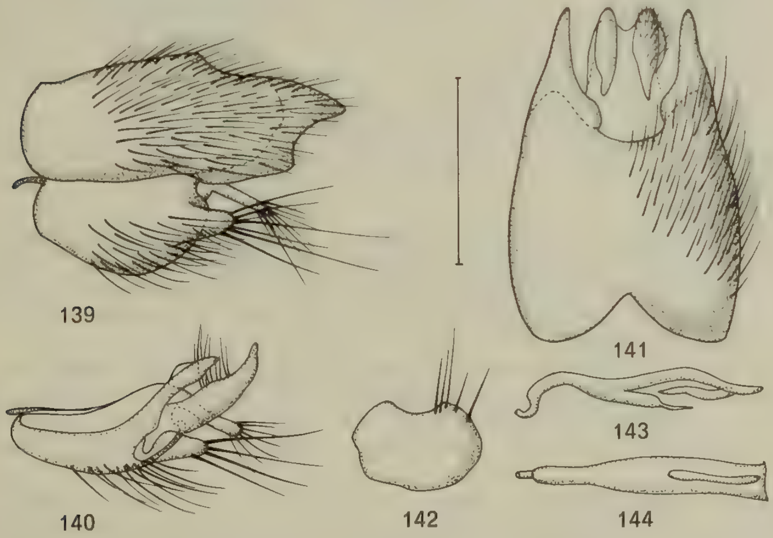
Terminalia (Text-figs 139–144). Epandrium and gonocoxites shining brownish black with black pile. Epandrium as in Text-fig. 141. Gonocoxite (Text-fig. 139) much shorter than epandrium, with a moderately long projection ventrally. Distal end of dorsal gonocoxal process comparatively long and slender. Stylus and ventral lobe (Text-fig. 140) of quite normal shape. Phallus in lateral view (Text-fig. 143) with a straight proximal section, then curved rather abruptly downwards at *ca* 90 degrees, the tip itself strongly upcurved; in dorsal view (Text-fig. 144), the phallus is narrow and gradually decreases in width. Dorsal apodeme small. Tergite 8 not preserved intact in the dissection. Sternite 8: Text-fig. 142.

Total length 4·8 mm.

♀. Unknown.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Tam., Moramanga, 9.x.1958 (*Fred Keiser*) (NMB).



FIGS 139–144. Male terminalia of *Stenopomyia minor*, holotype. 139, genitalia in lateral view; 140, right gonocoxite in intero-ventral view; 141, epandrium in dorsal view; 142, sternite 8; 143, aedeagus in lateral view; 144, aedeagus in dorsal view. Scale: 0·5 mm.

THE *VARIEGATA*-GROUP

There are four species in the *variegata*-group, which is certainly monophyletic in origin and sister-group to a part of the *keiseri*-group. The group is characterized by the following synapomorphic features: antennal insertion low; frons protruding ($> 0{\cdot}10$ mm); first antennal segment longer than the combined lengths of third antennal segment and style; and style comparatively short. The male terminalia seem to follow the ground-plan for the genus.

Stenopomyia variegata (Bigot) **comb. n.**

(Text-figs 74, 83, 87, 175–151)

Anabarhynchus variegatus Bigot, 1859 : 428; Kröber, 1913 : 267; Kröber, 1931 : 118. Holotype ♀, MADAGASCAR (BMNH) [examined].

DIAGNOSIS. ♂ ♀. Femora distinctly paler in colour than the corresponding tibiae (as in *fumipennis*). Cx_1 and cx_2 yellowish, not concolourous with cx_3 and pleura as is the case in *fumipennis*. Difference in colour between f_3 and t_3 very striking.

REDESCRIPTION. ♂. *Head* (Text-figs 74, 83). Facial index 0·41. Eyes separated by a frontal stripe which is slightly wider above than width of anterior ocellus and gradually widens below. Proboscis reaching to level of antennal bases. Labella broad and brownish black. Palpi much shorter than proboscis, blackish grey with short pile of black and pale hairs. Seen from above, upper half of frons whitish grey tomentose. Central area of lower half of frons blackish and subshining. Lateral areas of lower frons, face, genae and lower part of occiput whitish grey tomentose. Upper part of occiput greyish black, with about 16 post-ocular and occipital setae on each side. Antennae blackish, not distinctly tomentose, pile short and black.

Thorax. Seen from above, mesonotum blackish with moderately thick greyish tomentum and without any distinct pattern. Seen from behind, mesonotum black with a large confluent area of tomentum on anterior part. Mesonotal pile short and black. Scutellum coloured like the mesonotum, with black pile and 4 *sc* setae of almost equal size. Seen from above with the following parts of pleura dull blackish: anterior part of sternopleuron, and entire pteropleuron and hypopleuron, the other parts whitish grey tomentose.

Wings (Text-fig. 87). Cell M_3 rather narrowly open. Vein R_4 with proximal section almost straight, apical section with a rather deep curvature. Colour dark brownish, most intensively in apical and anterior parts. Stigma only slightly darker than rest of wing. Veins and halteres blackish.

Legs. F_1 with 1–3 *av* setae. F_2 without setae. F_3 with 3–6 short *av* setae and 5–8 even shorter *pv* setae, all situated in apical two-thirds. Cx_1 and Cx_2 yellowish with thin whitish tomentum. Cx_3 brownish black with whitish tomentum. Femora yellowish, not tomentose, with short pale hairs. T_1, t_2 and all tarsi dark brownish, t_3 blackish. Colour difference between f_3 and t_3 very striking.

Abdomen. In dorsal view all tergites thickly covered with silvery whitish tomentum and whitish hairs. In lateral view the antero-lateral corners of tergites 2–3 and 5–6 and entire lateral areas of tergite 4 are shining blackish and with blackish pile. Sternites shining brownish black and with mainly blackish hairs. With distinct whitish hind-marginal seams on segment 2–5.

Terminalia (Text-figs 145–151). Epandrium and gonocoxites yellowish brown with black pile. Epandrium as in Text-fig. 147. Gonocoxite (Text-fig. 145) much shorter than epandrium and with a broadly rounded ventral projection. Distal end of dorsal gonocoxal process comparatively short and broad. Stylus and ventral lobe (Text-fig. 146) rather narrow and simple, stylus pointed. Phallus in lateral view (Text-fig. 148) only slightly curved, in dorsal view (Text-fig. 149) rather broad proximally and suddenly constricted towards the narrow tip. Dorsal apodeme in lateral view (Text-fig. 148) slightly downcurved, in dorsal view (Text-fig. 149) of almost equal width throughout. Ventral and ejaculatory apodeme short and simple. Tergite 8: Text-fig. 150. Sternite 8: Text-fig. 151.

Total length 8·6–9·4 mm.

♀. *Head.* As in male, but frons broader and less striking in colour. Facial index 0·41.

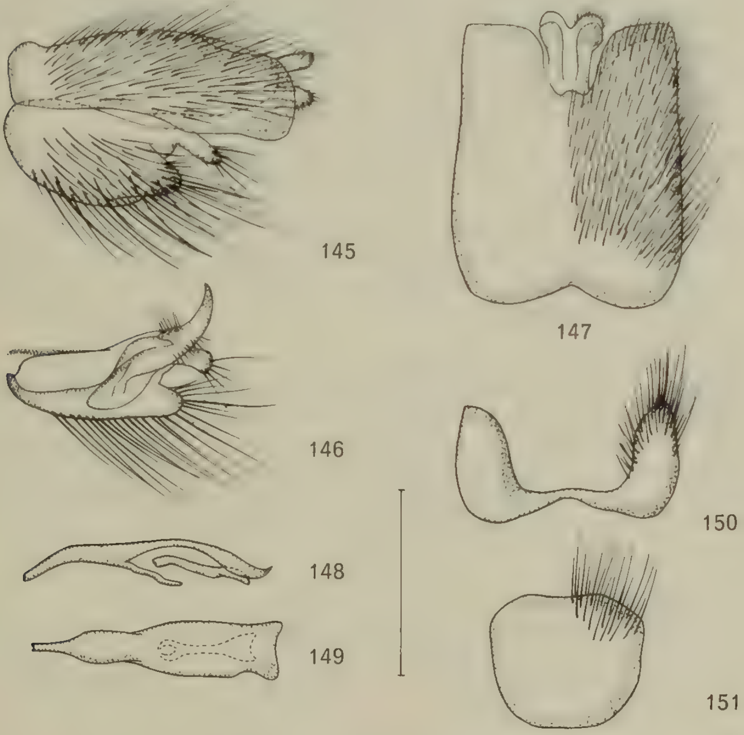
Thorax. Mesonotum more distinctly striped than in male.

Wings (Text-fig. 87). Distinctly longer and narrower than in male and in female of *fumipennis*, width of axillary cell approximately equaling width of anal cell. Colour dark brownish in apical part of wing only, and mostly in broad streaks along the veins, basal part greyish hyaline. Stigma, veins and halteres as in male.

Legs. As in male, but f_1 and f_2 may also have a few short *av* setae.

Abdomen. Segment 4 and the following segments distinctly compressed laterally. Tergite 1 brownish black on middle, whitish grey tomentose laterally. Tergites 2–3 predominantly shining blackish, but with distinct, continuous whitish grey tomentose posterior bands, occupying one-fourth to one-sixth of total tergal length. Tergite 4 entirely black. Tergites 5–6 mainly blackish, but with large, whitish grey tomentose oval spots laterally. Remainder of abdomen blackish. Pile short and mainly blackish, only whitish on tomentose areas of tergites 2–3. 6 + 6 terminal spines which are moderately long, narrow and pointed.

Total length 8·2–10·3 mm.



FIGS 145–151. Male terminalia of *Stenopomyia variegata*. 145, genitalia in lateral view; 146, right gonocoxite in intero-ventral view; 147, epandrium in dorsal view; 148, aedeagus in lateral view; 149, aedeagus in dorsal view; 150, tergite 8; 151, sternite 8. Scale: 0·5 mm.

MATERIAL EXAMINED.

Holotype ♀, MADAGASCAR: Bigot Coll. (BMNH); the specimen is in good condition, but the right wing is broken and only the left p_1 is preserved.

MADAGASCAR: Tam., Antanamba, 3 ♂, 3 ♀, 14.–15.ix.1957 (*Fred Keiser*) (NMB, ZMC); Tam., Manompana, 1 ♀, 12.xi.1957 (*Fred Keiser*) (NMB); 1 ♀, i 1954 (*J. Vadon*) (NMB); Fenerive, coastal forest, 1 ♂, 1 ♀, xii. 1955 (*B. Stuckenberg*) (NM).

***Stenopomyia fumipennis* sp. n.**

(Text-fig. 84)

DIAGNOSIS. ♂. Femora distinctly paler than tibiae, as in *variegata*, but not so brightly yellow as in this species. All coxae concolorous with pleura.

DESCRIPTION. ♂. *Head* (Text-fig. 84). Facial index 0·39. Practically as described for *variegata*, but with smaller dimensions. Blackish area on lower frons more polished than in *variegata* because of less tomentum. Upper part of occiput also more blackish and with fewer post-ocular and occipital setae, about 10 on each side. First antennal segment comparatively longer.

Thorax. Seen from above, mesonotum blackish with thin greyish tomentum, without any distinct pattern. Seen from behind, mesonotum black with two broadly separated bands of tomentum on anterior part. Mesonotal pile short and black. Scutellum coloured as mesonotum, with 4 strong *sc* setae. Pleura more whitish grey tomentose than in *variegata*, as the dull blackish areas are less extensive.

Wings. Cell M_3 narrowly open on one wing, closed at wing-margin on the other wing. Other characters as in *variegata*, including colour.

Legs. Femoral chaetotaxy as in *variegata*. Coxae whitish grey tomentose like the pleura. Femora yellowish to yellowish brown, F_3 being darkest. Tibiae and tarsi darker brownish, distinctly darker than femora.

Abdomen of practically the same colour as in *variegata*. No distinct differences were observed.

Terminalia. Epandrium and gonocoxites blackish brown with black pile, thus distinctly darker in colour than in *variegata*. The single specimen available was not dissected because of the difficult angle of the abdomen.

Total length 6·9 mm.

♀. *Head*. Facial index 0·43. Very similar to male, except for the broader frons.

Thorax. Mesonotum more blackish than in male; seen from behind without the very distinct tomentose stripes described above for the male.

Abdomen. Tergites mostly shining blackish, as in *variegata*. Tergites 2–3 with only postero-lateral corners whitish grey tomentose, thus without continuously tomentose posterior bands as in this species. Tergite 4 entirely black, and tergites 5–6 with large oval spots of whitish grey tomentum. Sternites, pile and terminal spines as in *variegata*.

Total length about 8 mm.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Moheli, Fomboni (*A. R.*) (MP).

Paratypes. MADAGASCAR: Moheli, Fomboni, 2 ♀ (*A. R.*) (MP & ZMC); Moheli, Kamgani, 1 ♀, vi. (*Pr. M.*) (MP).

***Stenopomyia fuscata* sp. n.**

(Text-figs 85, 152–158)

DIAGNOSIS. ♂ ♀. Femora distinctly darker in colour than the corresponding tibiae, as in *uncilobata*. Frons comparatively broader than in this species and more shining blackish above. Anterior ocellus larger than in *uncilobata*. Epandrium with striking differences in shape in the two species.

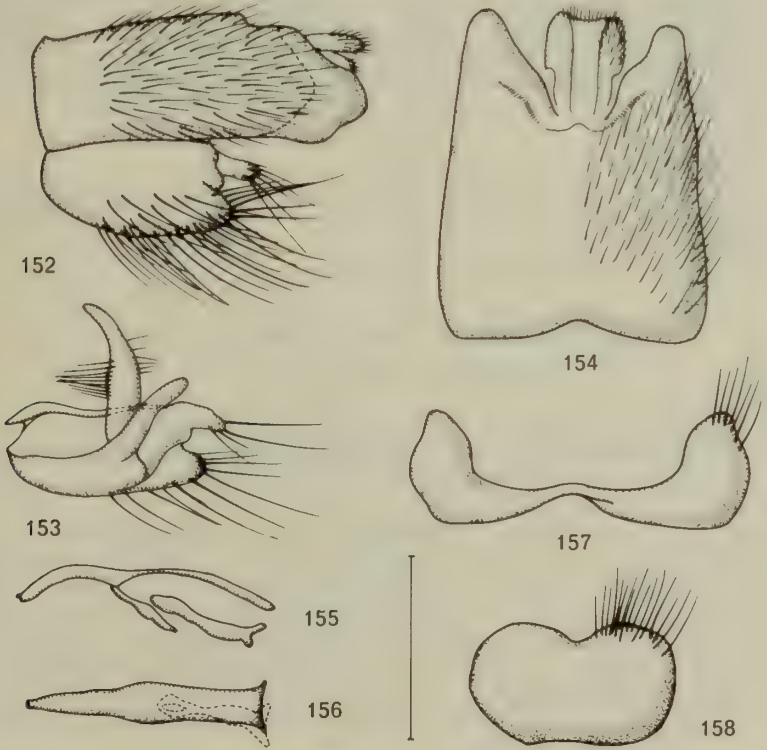
DESCRIPTION. ♂. *Head* (Text-fig. 85). Facial index 0·43. Frontal stripe slightly broader than in *uncilobata*. Proboscis reaching slightly beyond level of antennal bases. Labella and palpi blackish. Frons black, upper part subshining, middle part whitish grey tomentose and lower part shining with narrowly tomentose areas laterally along eye-margins. Face, genae and occiput with whitish grey tomentum. Upper part of occiput black, with about 16 post-ocular and occipital setae on each side. First and second antennal segments brownish black, thinly tomentose and with short black hairs. Third segment missing.

Thorax. Mesonotum blackish and subshining, i.e. with thin greyish tomentum. Scutellum coloured as mesonotum, with 4 *sc* setae of almost equal length. Pleura as in *variegata*.

Wings. Cell M_3 narrowly open. Vein R_4 with a curvature as in *variegata*. Colour greyish hyaline in basal part, brownish in apical part, the line of demarcation running over apical part of discal cell but not very sharp. Stigma of same colour as apical part of wing. Veins and halteres brownish black.

Legs. F_1 and f_2 with a few short *av* setae. F_3 with irregular rows of short *av* and *pv* setae in apical two-thirds or more. Colour dark brownish to blackish, tibiae and tarsi of p_1 and p_2 being palest.

Abdomen. In dorsal view tergites mostly whitish grey tomentose, but anterior parts of



FIGS 152–158. Male terminalia of *Stenopomyia fuscata*, holotype. 152, genitalia in lateral view; 153, right gonocoxite in intero-ventral view; 154, epandrium in dorsal view; 155, aedeagus in lateral view; 156, aedeagus in dorsal view; 157, tergite 8; 158, sternite 8. Scale: 0·5 mm.

tergites 2–3 and lateral parts of tergite 4 blackish. In lateral view these blackish areas are shining and cover anterior half of tergites 2–3 and entire lateral part of tergite 4. Distinct whitish yellow hind-marginal seams on tergites 2–4. Sternites mainly blackish and shining. Pile short and consisting of both black and pale hairs.

Terminalia (Text-figs 152–158). Epandrium and gonocoxites blackish and shining, with black pile. Epandrium as in Text-fig. 154. Gonocoxite (Text-fig. 152) with a moderately long projection ventrally. Distal end of dorsal gonocoxal process short and broad. Ventral lobe and stylus (Text-fig. 153) almost as in *variegata*. Aedeagus (Text-figs 155, 156) also practically as in *variegata*, but dorsal apodeme narrower, and phallic part narrowing more gradually. Tergite 8: Text-fig. 157. Sternite 8: Text-fig. 158.

Total length about 7·8 mm.

♀. *Head*. Facial index 0·46. Frons broader and mostly shining to subshining blackish, only narrowly tomentose along eye-margins. Frons with two depressed areas, one in front of anterior ocellus and one on middle of frons above the strongly projecting lower frons. These depressed areas wrinkled and therefore less shining. Other characters of head as in male. Third antennal segment in one of the paratypes blackish like the rest of antenna.

Thorax. Mesonotum apparently more shining black than in male.

Wings. Cell M_3 closed in one of the paratypes, narrowly open in the other. The paratype with closed cell M_3 has apical part of wing darkened as described for male. In the other paratype the wing is practically uniformly greyish hyaline.

Legs as in male.

Abdomen. Tergites mainly shining blackish. Tergites 1–3 with whitish grey tomentose lateral areas along posterior margins. Tergite 4 wholly black. Tergites 5–6 also with whitish grey tomentose areas, but not along posterior margins of tergites. Sternites blackish brown and shining. Pile short, black and sparse. 6 + 6 terminal spines which are moderately long, narrow and pointed.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Région du Sud-Est, Fort Dauphin, 1.ix.1901 (*Ch. Alluaud*) (MP).

Paratypes. 1 ♂, 2 ♀, same data as holotype.

Stenopomyia uncilobata sp. n.

(Text-figs 86, 159–165)

DIAGNOSIS. ♂. The dark coloured femora separate this species and *fuscata* from the other two species of the *variegata*-group. Frons narrower than in *fuscata*, not so shining, and anterior ocellus smaller. Epandrium differently shaped.

♀. Unknown.

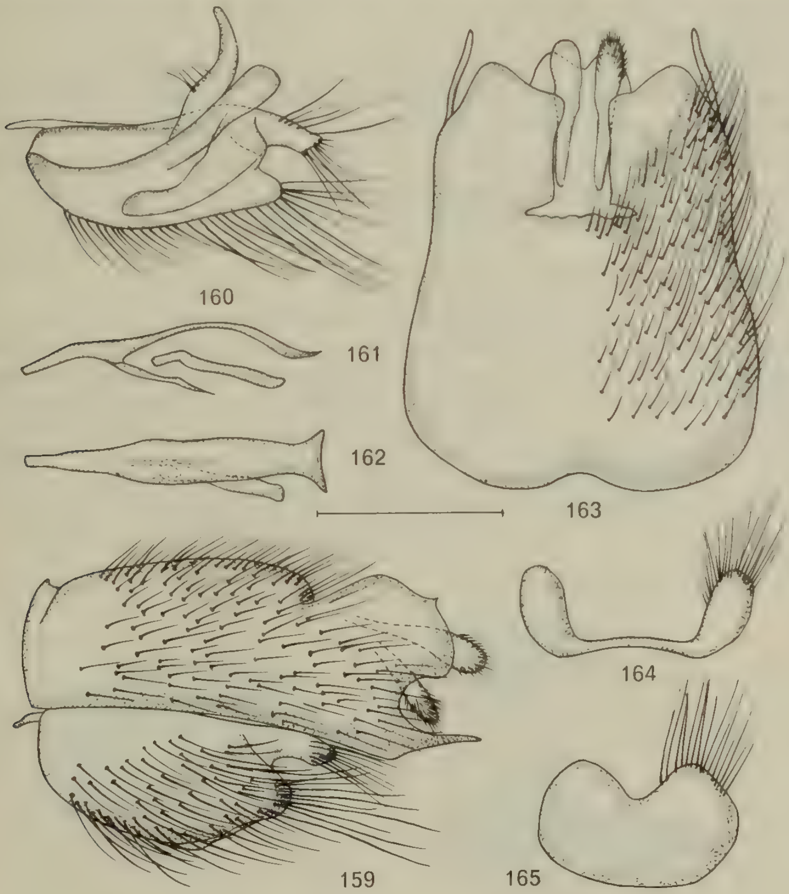
DESCRIPTION. ♂. *Head* (Text-fig. 86). Facial index 0·47. Eyes narrowly separated, forming a comparatively narrow frontal stripe. Proboscis reaching to level of antennal bases. Labella broad and blackish. Palpi shorter than proboscis, blackish, with short pile of both pale and black hairs. Seen from in front, upper half of frons dull blackish; in dorsal view, whitish grey tomentose above and below, with the central area blackish. Central area of lower half of frons shining blackish. Lateral areas of lower half of frons, face, genae and lower part of occiput whitish grey tomentose. Upper part of occiput greyish black with about 18 postocular and occipital setae on each side. Antennae blackish, hardly tomentose, pile short and black.

Thorax. Seen from in front, mesonotum blackish and subshining, i.e. with thin whitish grey tomentum. Seen from behind, mesonotum blackish with central area on anterior part whitish grey tomentose. Pile short and consisting of both black and whitish hairs. Scutellum black, thinly tomentose; 4 *sc* setae, the lateral pair nearly as long as the subapical pair. Seen from above, pleura whitish grey tomentose with anterior part of sternopleuron and entire pteropleuron and hypopleuron blackish.

Wings. Cell M_3 closed. Vein R_4 with proximal section slightly curved, apical section with a deep curve. Colour dark brownish in apical half, more brownish grey in basal half, but without a sharp line of demarcation. Stigma, veins and halteres brownish black.

Legs. F_1 with 2–4 short *av* setae. F_2 with 1–2 short *av* setae. F_3 with 4–6 short *av* setae and a row of about 8–12 even shorter *pv* setae along almost entire length. Coxae coloured as pleura. F_1 dirty brownish in holotype, more blackish brown in paratype. F_2 and f_3 blackish brown with yellowish tips, particularly distinct in f_2. Femoral pile short, mainly scaly and whitish. Tibiae brownish to blackish, t_3 being darkest, especially in paratype. Tarsi coloured as the corresponding tibiae.

Abdomen. In dorsal view, all tergites thickly silvery whitish tomentose, only central area of tergite 1 dark brownish and anterior margins of tergites 2–3 and lateral parts of tergite 4 narrowly blackish. In lateral view, anterior half of lateral areas of tergites 2–3 and entire lateral areas of tergite 4 blackish and shining. Pile of lateral areas on tergites 1–3 whitish,



FIGS 159–165. Male terminalia of *Stenopomyia uncilobata*, holotype. 159, genitalia in lateral view; 160, right gonocoxite in intero-ventral view; 161, aedeagus in lateral view; 162, aedeagus in dorsal view; 163, epandrium in dorsal view; 164, tergite 8; 165, sternite 8. Scale: 0·5 mm.

on tergites 4–6 blackish. Dorsal areas of tergites with mixed blackish and whitish hairs. Sternites shining brownish black, with pile as on lateral areas of tergites. Distinct whitish hind-marginal seams on segments 2–5.

Terminalia (Text-figs 159–165). Epandrium and gonocoxites reddish brown to brownish black, with black pile. Epandrium as in Text-figs 159, 163; with posterior margin modified, forming a large, balloon-shaped lobe dorsally and long, pointed hook ventrally. Gonocoxite (Text-fig. 159) much shorter than epandrium, its posterior margin with a broadly rounded projection; dorsally with a short and broad distal end of dorsal gonocoxal process. Stylus in ventral view (Text-fig. 160) comparatively long and narrow, blunt-tipped. Ventral lobe comparatively long and broad. Phallus in lateral view (Text-fig. 161) rather thick and only slightly curved, in dorsal view (Text-fig. 162) only slightly narrowing towards tip. Dorsal apodeme in lateral view (Text-fig. 161) low and moderately curved, in dorsal view (Text-fig. 162) about twice as wide as base of phallus and with a constriction near distal end. Ventral apodeme short and very narrow, almost linear. Ejaculatory apodeme simple. Tergite 8: Text-fig. 164. Sternite 8: Text-fig. 165.

Total length 7·6 mm.

♀. Unknown.

MATERIAL EXAMINED.

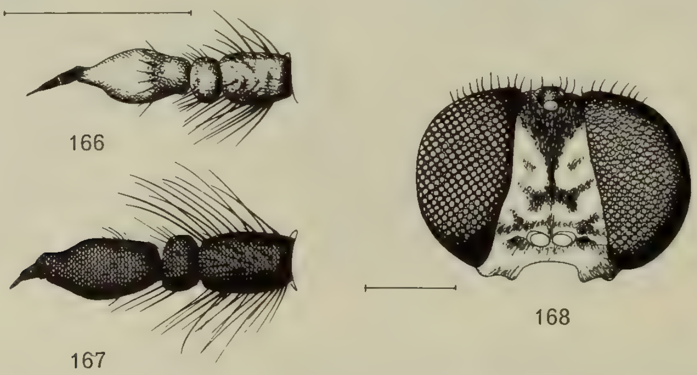
Holotype ♂, MADAGASCAR: Tam., Perinet, 6.x.1958 (*Fred Keiser*) (NMB).
Paratype. MADAGASCAR: Tam., Perinet, 1 ♂, 4.x.1958 (*Fred Keiser*) (ZMC).

***STENOSATHE* gen. n.**

Gender: feminine.
Type-species: *Thereva brachycera* Loew, 1857.

DESCRIPTION. *Head*. Male eyes completely touching for a long distance on frons. Upper facets enlarged and clearly demarcated from the smaller facets. Female frons moderately broad, entirely tomentose with brownish and greyish colours, but not forming any distinct pattern. Frons in both sexes usually with distinct hairs. Face bare and with margins moderately diverging below. Facial indices varying between 0·56 and 0·62, i.e. clearly higher than in *Stenopomyia*, but within the range of *Irwiniella*. Palpus one-segmented. Proboscis rather long and with large labella. First antennal segment shorter than third segment without style.

Thorax. Three notopleural, 1–2 supraalar and one postalar setae. Number of scutellar setae not constant; 2, 3 or 4 may be present, sometimes irregularly arranged. Prosternum



FIGS 166–168. *Stenosathe*. 166, *S. brachycera*, ♂ antenna; 167, *S. pilosa*, antenna of ♂ holotype; 168, *S. brachycera*, ♀ head in frontal view. Scale: 0·5 mm.

haired on lateral parts or on whole surface. Sternopleuron almost bare in female, but with some hairs on upper part in male. Pleura uniformly coloured and sparsely haired.

Wings. Vein R_4 more or less strongly curved and cell M_3 broadly open. Ground-colour hyaline, greyish or brownish tinged.

Legs. Coxae coloured like the pleura and bare on posterior surface of cx_1 and cx_2. F_1 and f_2 without *av* setae, f_3 with a few short *av* setae. Tibial chaetotaxy as in *Stenopomyia*, but *pv* setae on t_3 always very short and few in number.

Abdomen in both sexes slender and only slightly tapering, with only slight sexual differences in pattern and shape. Abdominal pile short and sparse.

Male terminalia. Epandrium basically rectangular, but with a very deep V-shaped incision into posterior margin. Gonocoxite quite simple in shape, and distal end of dorsal gonocoxal process varying in length. Stylus and ventral lobe as usual in this group of genera. Aedeagus in lateral view with rather a strongly down-curved phallic part. Dorsal apodeme almost straight in lateral view, narrower than proximal part of phallic part in dorsal view and strongly tapering distally. Sternite 8 rather variable in shape.

REMARKS. This genus is erected for two apparently closely related species occurring in Rhodesia and Natal. It may well be the sister-group of the genus *Stenopomyia* from Madagascar. The narrow, rod-shaped dorsal apodeme certainly represents an apomorphic character in comparison with *Stenopomyia*, whereas the simple epandrium is plesiomorphic compared with the varied and complicated shape of the epandrium in *Stenopomyia*. The genera *Stenosathe* and *Stenopomyia* may together be the sister-group of *Irwiniella*, and all three genera together with *Schoutedenomyia* form a group which would be called '*Psilocephala*' using a conservative terminology.

KEY TO SPECIES OF *STENOSATHE*

1 Prosternum haired on whole surface. Palpus with black pile. Third antennal segment mostly yellowish brown (Text-fig. 166) . . . **brachycera** (p. 247)
– Prosternum only haired laterally. Palpus with yellowish pile. Third antennal segment mostly blackish (Text-fig. 167) . . . . . **pilosa** (p. 249)

Stenosathe brachycera (Loew) **comb. n.**

(Text-figs 166, 168, 169–175)

Thereva brachycera Loew, 1857 : 342; Loew, 1861 : 54. LECTOTYPE ♂, 'Caffraria' [Natal] (NRS), here designated [examined].
Psilocephala brachycera (Loew) Kröber, 1912 : 125; Kröber, 1931 : 126.

DIAGNOSIS. ♂♀. Prosternum haired on whole surface. Male frons bare, or more sparsely haired than in *pilosa*. Antennal segment 3 mainly yellowish brown.

REDESCRIPTION. ♂. *Head* (Text-fig. 166). Facial index 0·56. Eyes touching for a distance equal to height of ocellar triangle. Proboscis reaching to level of middle of first antennal segment; labella blackish. Palpi nearly as long as proboscis, brownish and with long black pile. Frons bare or with a few short black hairs on middle. Frons seen from in front brownish grey tomentose, upper corner and areas lateral to antennal bases dull dark brownish. Face, genae and upper part of occiput brownish tomentose. Lower part of occiput whitish grey tomentose. About 15 post-ocular and occipital setae on each side. First and second antennal segments brownish black and slightly whitish tomentose. Third antennal segment yellowish brown, basal half more or less darkened, but not on the extreme narrow base of the segment. Style black. Pile on first segment rather long.

Thorax. Mesonotum brownish grey tomentose, only indistinctly striped. Mesonotal pile long (about 0·30 mm) and consisting of erect, brownish hairs and more adpressed, yellowish hairs. Scutellum coloured as mesonotum, exclusively pale-haired, 2–4 *sc* setae of nearly equal size. Pleura with only thin greyish tomentum, leaving the pleura subshining in lateral view. Prosternum with hairs on whole surface.

Wings. Vein R_4 with only a slight curvature distally. Colour greyish brown, most intensely along costal margin. Stigma, veins and halteres brownish black.

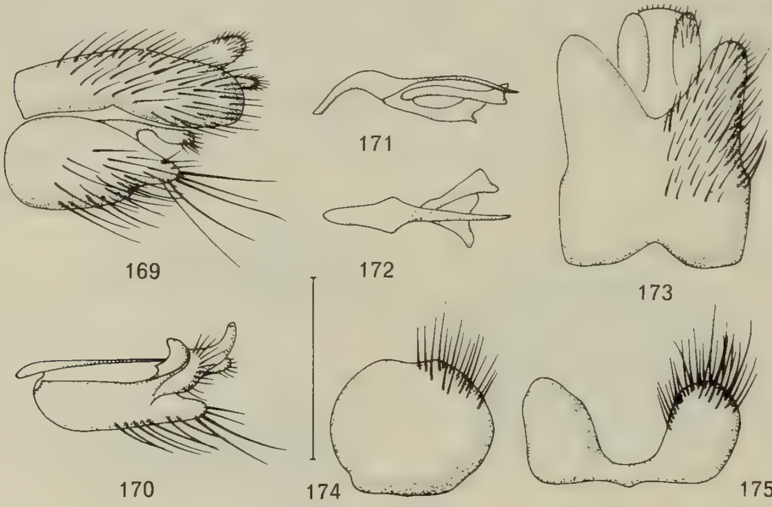
Legs. F_1 and f_2 without setae. F_3 with a few short *av* and *pv* setae distributed along apical half or more. Femora brownish black and distinctly shining, often slightly paler brownish apically. Tibiae and tarsi of p_1 and p_2 dirty yellowish brown, t_3 and its tarsus brownish black, like the femora.

Abdomen. All tergites brownish black and shining. Lateral areas of tergite 1 and anterior part of tergite 2 greyish tomentose. Posterior margins of tergites 2–3 also very narrowly tomentose, these tomentose margins widening laterally, so that posterior corners of the tergites are greyish tomentose. Tergites 2–5 also with pale hind-marginal seams. Sternites shining brownish black. Abdominal pile rather long and pale, only black on posterior sternites.

Terminalia (Text-figs 169–175). Epandrium and gonocoxites brownish black with blackish pile. Epandrium as in Text-fig. 173. Gonocoxite (Text-fig. 169) with a moderately long process posteriorly. Distal end of dorsal gonocoxal process short and very narrow proximally. Stylus and ventral lobe (Text-fig. 170) both short. Aedeagus in lateral view (Text-fig. 171) with phallic part gradually decreasing in width and rather strongly curved. In dorsal view (Text-fig. 172) the phallus is broad proximally and of gradually decreasing width, while the dorsal apodeme is very narrow and sharply pointed distally. Both ventral and ejaculatory apodemes have the distal part thickened. Tergite 8: Text-fig. 175. Sternite 8: Text-fig. 174.

Total length 6·4–8·1 mm.

♀. *Head* (Text-fig. 168). Facial index 0·60. Seen from in front, frons and face brownish grey tomentose with shifting spots of dull brownish black appearance. On the areas lateral to antennal bases the tomentum is more whitish grey. Entire frons with short, black hairs. Rest of head as in male, but proboscis may be slightly longer, often reaching to level of apex of first



Figs 169–175. Male terminalia of *Stenosathe brachycera*. 169, genitalia in lateral view; 170, right gonocoxite in intero-ventral view; 171, aedeagus in lateral view; 172, aedeagus in dorsal view; 173, epandrium in dorsal view; 174, sternite 8; 175, tergite 8. Scale: 0·5 mm.

antennal segment. Third antennal segment usually paler than in male, i.e. not so intensely darkened in basal part. Antennal pile shorter.

Thorax. Mesonotum on disc with three dark brownish bands separated by two more greyish brown stripes. Anterior and lateral parts of mesonotum with a thin, pure greyish tomentum. Mesonotal pile much shorter than in male and adpressed. Rest as in male.

Wings and *legs* as in male.

Abdomen as in male, but tergites 4–5 also with thin whitish grey tomentum on posterior parts. Mesonotal pile short. 7 + 7 comparatively long and moderately pointed spines at tip of abdomen.

Total length 6·5–7·7 mm.

REMARKS. Loew (1857 : 342) gave a short diagnosis of the male sex of this species based on material fron 'Caffraria' collected by J. Wahlberg. Four years later, Loew (1861 : 54) repeated the original short diagnosis and added a longer description in German. He then, erroneously, gave the sex as ♀. The syntypic series consists of three male specimens in the Stockholm Museum. One is labelled with two numbers only: '167' and '49'. This specimen is intact but slightly mouldy. The other two syntypes are labelled 'Caffraria', 'J. Wahlb.' and '167'. One of these has only the left p_3 preserved and the antennae are also missing, while the other has lost the head and abdomen, these parts being glued to a card on the pin. All specimens are certainly conspecific and agree well with the description. The first mentioned specimen is hereby designated as lectotype and has been labelled accordingly.

DISTRIBUTION. The species seems to be restricted to the coastal plains of Zululand and the Natal province of South Africa.

MATERIAL EXAMINED.

Lectotype ♂ and 2 paralectotypes ♂, SOUTH AFRICA: Natal ('Caffraria') (*J. Wahl berg*) (NRS) (see remarks above).

SOUTH AFRICA: Natal, Durban, 1 ♂, ix. 1920 (*C. v. d. Merwe*) (SAM); same locality, 3 ♂, 2 ♀, viii. 1920 (*C. v. d. Merwe*) (SAM & BMNH); same locality, 2 ♂, 19.viii. & 6.ix.1906 (*G. F. Leigh*) (TM); same locality, 1 ♂, 5.iii.1944 (*Marley*) (SAM); Stella Bush, Durban, 1 ♂, 5.ix.1943 (*Marley*) (SAM); same locality, 1 ♀, Moor, 2 ♂, iv. 1916 (*Marley*) (SAM); Umhlanga Rocks, 2 ♂, 1 ♀, 6 & 9.v.1957 (*Schofield*) (NM & ZMC); Umkomaas, 1 ♀, 1.i.1935 (*L. Bevis*) (NM); Pinetown, 1 ♀, 6.iv.1910 (*G. F. Leigh*) (TM); Winklespruit, 1 ♀, 7–11.iv.1962 (*L. Vári*) (TM); Natal, Durban, Umbilo, 1 ♂, 8.xii.1914, 1 ♀, 27.ix.1916, 1 ♀, 7.x.1919, 1 ♂, 24.iv.1921, 1 ♀, 2.xii.1936 (*A. L. Bevis*) (DM); Natal, Durban, Bluff, 1 ♂, 12.xii.1936 (*L. Bevis*) (DM); Natal, Sūnwich Port, 1 ♂, x. 1951 (NM); Zululand, Mtunzini, 1 ♂, xii.1961 (*W. J. Lawson*) (DM); Zululand, Dukuduku between St. Lucia & Matubatuba, 2 ♂, 1 ♀, 7–8.iv.1960 (*B. & P. Stuckenberg*) (NM & ZMC).

Stenosathe pilosa sp. n.

(Text-figs 167, 176–182)

DIAGNOSIS. ♂ ♀. Distinguished from *brachycera* by having hairs only on lateral parts of prosternum, the frontal pile stronger, and blackish third antennal segment.

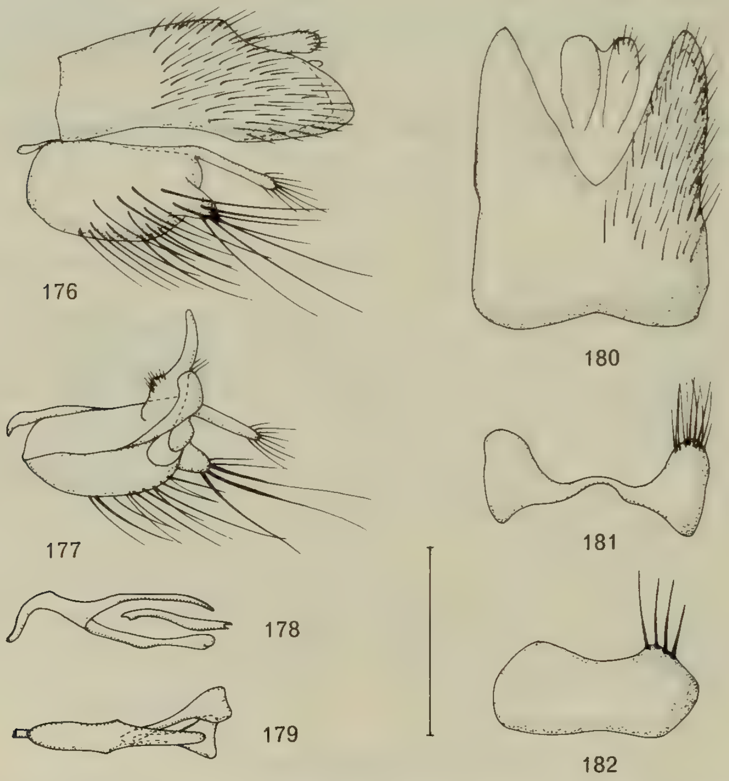
Description. ♂. *Head* (Text-fig. 167). Facial index 0·62. Eyes touching for a distance equal to height of ocellar triangle. Upper facets more enlarged than in *brachycera*. Proboscis reaching to level of antennal bases. Palpus yellowish brown and with long, black hairs. Frons with numerous long black hairs. Frons, face and genae brownish grey to dark brownish tomentose, darkest on frons. Occiput with pale brownish grey tomentum, not much darker on upper part than on lower part. Some long black, stiff hairs on genae and lower occiput. Post-ocular setae very long and thin, about 8–9 on each side; occipital setae numerous and hair-like. Antennae blackish, first and second segments slightly brownish grey tomentose; third segment slightly paler at extreme base. Pile on first antennal segment long.

Thorax. Mesonotum brownish grey to dark brownish tomentose, darker than in *brachycera*. Mesonotal pile long and blackish. Holotype with 2 *sa* setae on right side, one *sa* seta on left side. Scutellum brownish grey, with pale hairs and 3–4 strong *sc* setae of almost equal size. Pleura more pure greyish tomentose, but still with a brownish tinge.

Wings. Vein R_4 curved as in *brachycera*. Colour uniformly greyish brown. Stigma, veins and halteres brownish black.

Legs. F_1 and f_2 without *av* setae. F_3 with only a few very inconspicuous *pv* setae. Femora brownish black and shining with black pile. Tibiae dark brownish. Tarsi blackish.

Abdomen. Tergites mostly blackish and shining, tergites 2–5 with shining yellowish brown posterior corners and also a narrow yellowish brown stripe along posterior margin of the



Figs 176–182. Male terminalia of *Stenosathe pilosa*, holotype. 176, genitalia in lateral view; 177, right gonocoxite in intero-ventral view; 178, aedeagus in lateral view; 179, aedeagus in dorsal view; 180, epandrium in dorsal view; 181, tergite 8; 182, sternite 8. Scale: 0·5 mm.

tergites. The yellowish brown posterior corners with very indistinct pale tomentum. Tergite 1 more distinctly tomentose laterally. Sternites mostly yellowish brown and shining, but anterior parts of sternites 2–5 blackish. Pile short and black on disc of tergites, longer and paler on lateral parts of tergites and on sternites.

Terminalia (Text-figs 176–182). Epandrium and gonocoxites dark brownish and shining, with black pile. Epandrium as in Text-fig. 180. Gonocoxite (Text-fig. 176) with a moderately long process on posterior margin. Distal end of dorsal gonocoxal process very long and slender, projecting well beyond level of posterior margin of gonocoxite. Ventral lobe (Text-fig. 177) short and broad, but weakly sclerotized. Stylus with a long and pointed tip. Aedeagus practically as in *brachycera*, but phallic part more strongly curved and dorsal apodeme a little broader in dorsal view (Text-fig. 179). Tergite 8: Text-fig. 181. Sternite 8: Text-fig. 182.

Total length 7·1 mm.

♀. *Head*. Frons of practically the same width as in *brachycera* and with numerous short black hairs. Frons, face and genae brownish grey to dark brownish tomentose, frons without distinct pattern. Rest as in male, but base of third antennal segment paler brownish than in male, and basal segments more distinctly greyish tomentose.

Thorax. Mesonotum with three dark brownish bands separated by brownish grey stripes. Anterior and lateral parts also paler greyish tomentose. Both female paratypes with only one *sa* seta on each side. Scutellum and pleura (and also parts of mesonotum) appearing much paler than in male, because the ground-colour is pale brownish and partly translucent.

Wings as in male, but cell M_3 more broadly open.

Legs with chaetotaxy of femora as in male. Femora yellowish brown, about the same colour as tibiae, and tarsi also paler than in male. Coxae partly yellowish brown translucent.

Abdomen. Tergites almost wholly shining, only small lateral areas of tomentum on tergite 1. Ground-colour of tergites brownish to brownish black, darkest on anterior parts of first tergites, but not forming any distinct pattern. Pile short and mainly pale. Only 4 + 4 terminal spines which are short, broad and rather blunt-tipped.

Total length 7·0 mm.

MATERIAL EXAMINED.

Holotype ♂, RHODESIA: N. Vumba, 24.viii.1965 (*D. Cookson*) (NM).

Paratypes. Same locality as holotype, 2 ♀, 28.vi.1965 & 15.vii.1965 (*D. Cookson*) (NM & ZMC).

IRWINIELLA gen. n.

Gender: feminine.

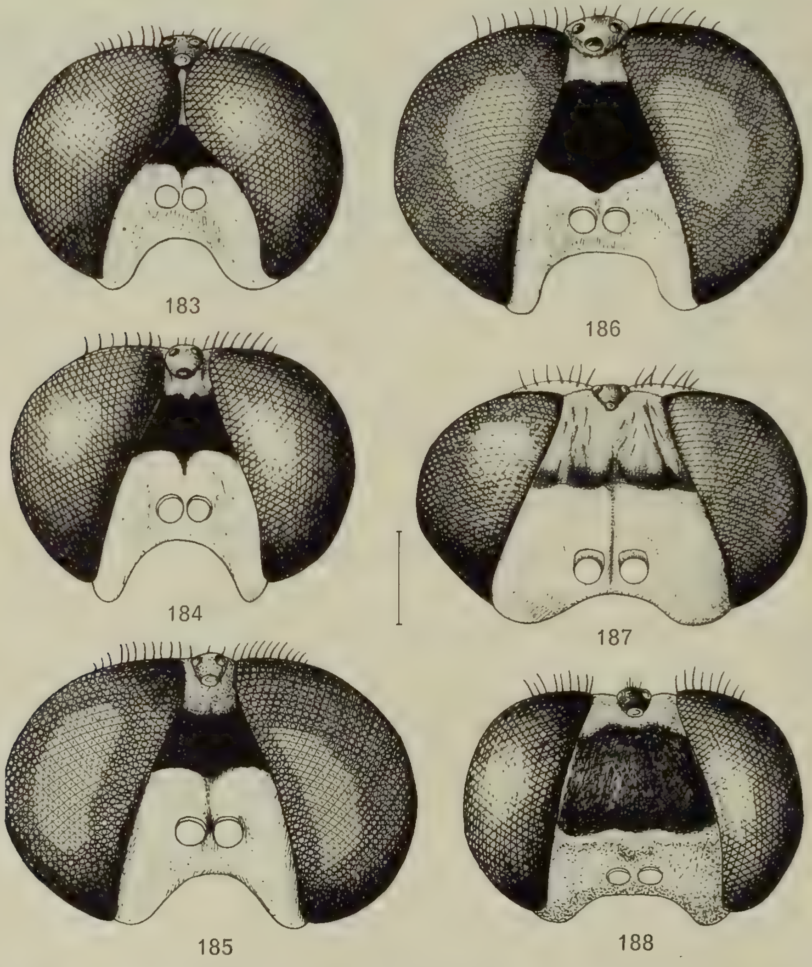
Type-species: *Thereva Nuba* Wiedemann, 1828.

DESCRIPTION. *Head* (Text-figs 183–188). Face rather narrow compared with height of head. Facial margins diverging rather slightly from level of antennae down to level of bottom of eyes. Facial indices varying between 0·50 and 0·87, i.e., distance between lower corner of eyes in males 50–80 per cent of height of head, in females 56–87 per cent of height of head. Eyes in male (Text-fig. 183) practically touching for a shorter or longer distance, and separated by less than width of anterior ocellus. In females (Text-figs 184–188) the eyes are separated by a frontal stripe of rather variable width. The frontal stripe often has an area of dark tomentum on upper part, but shining calli never occur. The extreme upper part of male frons in most species is coloured in a similar way, but in varying degrees. Genae either narrow, ridge-shaped and bare, or broader, more evenly curved, and then often with short black or white pile. Frons usually with hairs, but bare in males of some species. Face bare, only haired in *semiargentea*. The number of post-ocular and occipital setae varies strongly between species. Antennae (Text-figs 189–203) always simple and inserted high on the head. There are distinct interspecific differences in length and width of the various antennal segments, and in the length of pile on the first segment (see figures). Style comparatively long, two-segmented, ratio of the two sections variable; with an apical spine. Palpi one-segmented, narrow and of equal width throughout. Eye-facets of equal size; upper facets slightly enlarged in the males of some species, but never with a sharp line of demarcation between larger and smaller facets.

Thorax. Mesonotum with 3 notopleural, 1–2 supraalar and 1 postalar setae. 0–2 pairs of dorsocentral setae. Scutellum always with 4 strong setae. Prosternum with long hairs on entire surface. Sternopleuron with long hairs on most of its surface, even on the ventral and anterior parts.

Wings. Cell M_3 open or closed. Cell R_4 rather wide towards apex, at most 2·2 times as long as wide between tips of veins R_4 and R_5.

Legs. Cx_1 and cx_2 with long hairs on anterior and posterior surfaces. All femora usually have anteroventral setae, but these may be absent on f_1 and f_2. T_1 with anterodorsal, posterodorsal and posteroventral setae, and t_2 and t_3 with rows of setae in all four positions, i.e. anteroventral setae also present. All tibial setae comparatively long, usually as long as or longer than tibial diameter.



FIGS 183–188. *Irwiniella*, heads in frontal view. 183, *I. nuba*, ♂; 184, *I. nuba*, ♀; 185, *I. tomentosa*, ♀; 186, *I. velutina*, ♀; 187, *I. natalensis*, ♀; 188, *I. pallida*, ♀. Scale: 0·5 mm.

Abdomen. In the male sex this is often entirely whitish grey tomentose, rarely with black anterior bands on the first tergites. In the females of most species tergites 2–3 have large, blackish triangular bands with their bases on the anterior margins, while tergites 5–6 have smaller, dark triangular bands with their bases on the posterior margins, and tergite 4 is almost entirely blackish, at most slightly tomentose laterally.

Male terminalia. Epandrium comparatively long, though always broader than long along mid-line. Paraproct in some species continuing into a narrow sclerotization of the intersegmental membrane; in other species without any such sclerotization. Dorsal gonocoxal process with a long free end which overhangs posterior margin of gonocoxite. Stylus also large. The ventral lobe is shaped as a simple, longer or shorter, narrow excrescence from the ventral margin of the gonocoxite. Hypandrium present only as a very narrow bar between the ventral bases of the gonocoxites. Aedeagus simple, with a rather short and more or less strongly curved phallus. Dorsal apodeme comparatively large, in lateral view almost straight, in dorsal view of rather variable shape but usually broad and sometimes tending to have lateral offshoots. Ejaculatory apodeme short and simple. Tergite 8 more or less strongly constricted medially. Sternite 8 either simple or with a more or less deep incision on posterior margin.

REMARKS. The genus *Irwiniella* is named in honour of Dr M. E. Irwin, Pietermaritzburg, South Africa, who has made extensive collections and observations on Therevidae.

The genus is represented by fifteen species in the Ethiopian Region, but more species will certainly be discovered by further collecting. The genus seems to be distributed in all parts of the continental part of the region, and occurs also on the Cape Verde Is., Socotra, Madagascar, and Rodrigues I. east of Mauritius. This distribution pattern indicates that the genus is of considerable age or has extraordinary powers of dispersal, or both. Unfortunately, it has not been possible to establish the sister-group relationships of the Ethiopian members of the genus. The numerous characters available form, as is so often the case, a very complicated pattern of apomorphic and plesiomorphic conditions which it has not been possible to arrange into any scheme for the establishment of sister-groups. This can probably only be done when the numerous species of the genus occurring in the Indo-Oriental region have been worked out in a satisfactory way, or when other hitherto unused characters of the adults or of the immature stages are taken into consideration.

However, a few comments may be of interest for future study. The two species *maritima* and *bezzii*, which occur on the isolated Rodrigues I., undoubtedly form a monophyletic group, i.e., they have derived from a common ancestor. Several synapomorphic characters suggest this: sternite 8 narrow and with a deep incision on posterior margin; stylus with a distinct projection on middle; phallus almost straight in lateral view; dorsal apodeme broadly oval. The female probably of both species (only the female of *maritima* is known) has an abdominal pattern which may be called plesiomorphic, namely with dark bands or triangular spots with their bases on the *anterior* margins of *all* tergites. If this holds good, the female abdominal pattern of the other Ethiopian species may be termed apomorphic. In these species the pattern consists of dark bands on the anterior margins of tergites 2–3 and of smaller, triangular dark areas on the *posterior* margins of tergites 5–7, while tergite 4 is almost entirely dark.

Three species, *velutina*, *flavicornis* and *oldroydi*, are restricted to Madagascar and certainly form a monophyletic group, although it is not possible to state any synapomorphic characters for the group. However, it seems clear that the Malagasian species-group is more closely related to the species of continental Africa than to the species-group on Rodrigues I.

On the Cape Verde Is. there is also a species-group which is undoubtedly of monophyletic origin. It consists of *semiargentea* and *lindbergi*, the former being endemic to São Tiago and Antão, and the latter to Boa Vista. It is interesting to note that in these closely related species there is a striking difference in frontal and facial pile, a character often used by older authors to separate '*Psilocephala*' and '*Thereva*'. *I. semiargentea* has hairs on frons and upper face, whereas these parts are totally bare in *lindbergi*.

Most species of this genus are restricted to coastal dune localities, but several species (*nuba*, *tomentosa* and others) also occur at inland localities far from the sea. Further details will certainly appear in the future thanks to the intensive fieldwork being carried out by Dr. M. E. Irwin of Pietermaritzburg.

It is of interest to note that a female of *nuba* (Wiedemann) collected at Sherdi, Sudan, was stated to be predatory on cotton aphids. Very few observations have been published on the feeding activity of adult Therevidae, but predatory behaviour by *nuba* seems most improbable. The specimen in question was certainly only feeding on the aphid excretions (see also Irwin, in press).

RELATIONSHIPS. For the moment it seems best to arrange *Irwiniella* between the two more plesiomorphic genera *Stenopomyia* and *Stenosathe* described above and the more apomorphic genera treated later in the paper. The following characters, which were listed as plesiomorphic for *Stenopomyia* (see p. 222), are present in their apomorphic state in *Irwiniella*: head flattening more pronounced, but moderate; facial indices between 0·50 and 0·87, i.e. facial width between lower corner of eyes 50–87 per cent of head height; prosternum haired on entire surface; sternopleuron haired; cx_1 and cx_2 haired on posterior surface; dorsocentrals often present; and cell R_4 comparatively shorter and wider towards apex. On the other hand, the shape of the epandrium of *Irwiniella* certainly represents a more plesiomorphic state than in *Stenopomyia* and the same may be true of the broader aedeagus. Its relationship with the small genus *Stenosathe* is discussed on p. 247.

The relationships between *Irwiniella* and the more advanced genera, *Neophycus*, *Neothereva*, *Pseudothereva*, *Thereva* and *Caenophthalmus*, can be outlined as follows: *Neophycus*, *Neothereva* and *Pseudothereva* are clear derivates from *Irwiniella*, both genera being characterized by a few characters which are apomorphic by comparison with the conditions in *Irwiniella* (see further p. 289 and p. 296).

Its relationship with *Thereva* is less clear, because the *Thereva* of the Ethiopian region form a polyphyletic group with at least four monophyletic species-groups. Some of these may in fact be more closely related to *Irwiniella* than to some of the other species-groups of *Thereva*. The species assigned to the genus *Thereva* are united by further anagenetic progress in head-depression (see also p. 305), giving rise to head indices usually over 1·00, and by the consequent presence of pile on the face.

KEY TO SPECIES OF *IRWINIELLA*

MALES

1 Lateral margin of tergite 4 with long blackish pile that contrasts strongly with the lateral whitish pile of the other tergites which is strikingly long and tufted on tergites 5–7. Tergites 2–3 with very distinct, shining blackish, anterior bands that occupy about half of total tergal length along mid-line. Antennae long and slender (Text-fig. 191). Mesonotum with a broad, brownish black median band. (C., E. and S. Africa) . . . . ***tomentosa*** (p. 263)

– Lateral margin of tergite 4 with whitish pile as on lateral margins of the other tergites. All tergites usually entirely tomentose, or at most with narrow, brownish black anterior bands which do not occupy more than one-fourth of total tergal length along mid-line 2

2 All femora bicoloured, apical third to half yellowish brown, but without a sharp line of demarcation. Wings extensively brownish coloured. Antennae (Text-fig. 194) yellowish brown. Mesonotum with a broad, brownish median band. *Dc* setae absent. (Congo) . . . . ***chapini*** (p. 270)

– Femora not bicoloured, blackish, brownish black or yellowish brown from base to apex, or dark with extreme apex yellowish brown, sometimes dulled with whitish or greyish tomentum 3

3 Femora yellowish brown to brownish, at most slightly darkened at tip of f_1. Femora not distinctly tomentose 4

– Femora blackish to brownish black, at most slighly yellowish brown apically, often dulled by greyish tomentum 7

4 *Dc* setae present . . . . ***pallida*** (p. 272)

– *Dc* setae absent 5

5 Wings whitish tinged, with dark infuscations along veins. Facial indices ca 0·70. Smaller species: 6·0–6·6 mm. (South Africa) . . . . . ***pallipes*** (p. 258)

– Wings uniformly brownish grey tinged. Facial indices 0·50–0·55. Larger species: 8·8–10·0 mm. (Madagascar) 6

6 Humeri, postalar calli, scutellum and abdomen yellowish brown translucent ***flavicornis*** (p. 279)

– Humeri, postalar calli and scutellum greyish tomentose like the rest of thorax, and abdomen also entirely covered with tomentum . . . . ***oldroydi*** (p. 280)

7 Frons bare 8

– Frons with lateral groups of black hairs 11

8 *Dc* setae absent. Genae narrowly ridge-shaped and bare. Frons black on upper two-thirds. (Madagascar) . . . . ***velutina*** (p. 276)

– *Dc* setae present. Genae wider, more evenly curved and haired at least posteriorly. Frons darkened only at extreme apex 9

9 Third antennal segment (without style) longer than first segment (Text-figs 192, 196); its apical part very narrow 10

– Third antennal segment (Text-fig. 203) shorter than first segment; its apical part very short. Mesonotum with indistinct brownish and brownish grey stripes. (Cape Verde Is.) . . . . ***lindbergi*** (p. 287)

10 Third antennal segment (Text-fig. 192) with the narrow apical part about half as broad as basal part. Mesonotum greyish with one broad median band. (Socotra) ***albohirta*** (p. 267)

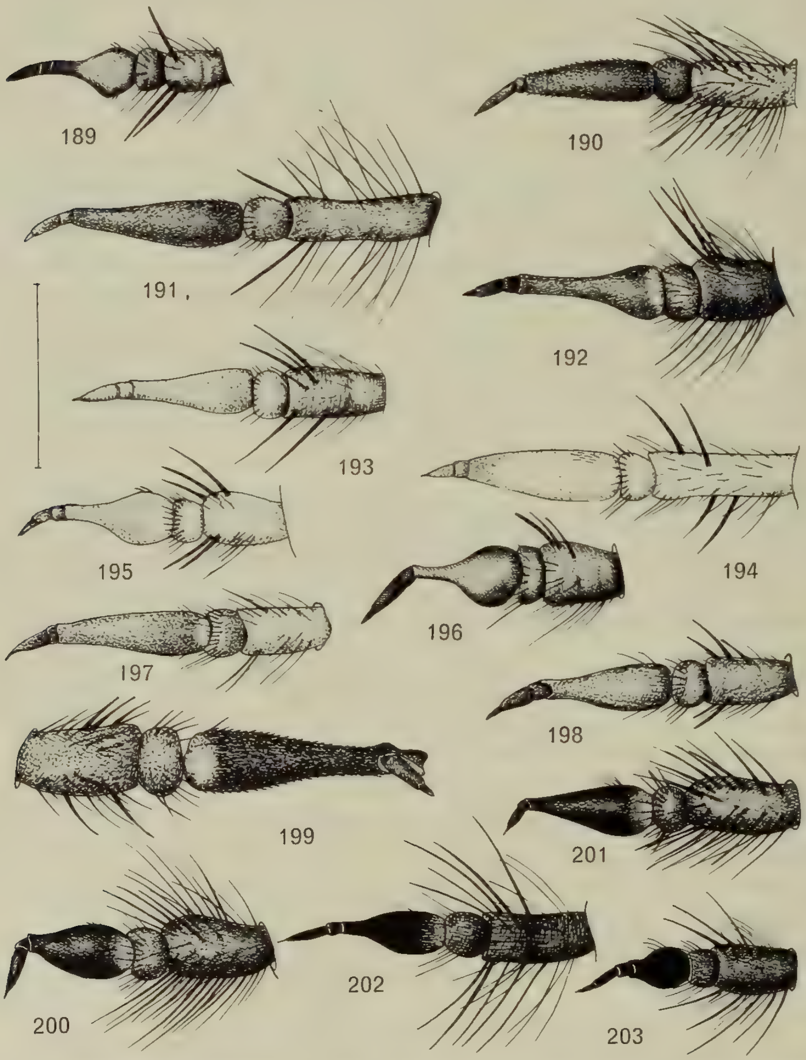
– Third antennal segment (Text-fig. 196) with the narrow apical part about one-sixth as broad as basal part. Mesonotum grey with three distinct brownish bands. (Natal) . . . . ***natalensis*** (p. 274)

11 About 10–14 post-ocular + occipital setae on each side. Third antennal segment (Text-figs 190, 193) comparatively slender, and tapering gradually . . . 12

– More than 25 post-ocular + occipital setae on each side. Third antennal segment (Text-figs 200, 201, 202) comparatively broad, and tapering more rapidly . . 13

12 *Dc* setae present. Pile on first antennal segment (Text-fig. 190) comparatively long. (NE. Africa) . . . . **nuba** (p. 260)

– *Dc* setae absent. Pile on first anntenal segment (Text-fig. 193) comparatively short. (Aden) . . . . **arabica** (p. 269)



FIGS 189–203. *Irwiniella*, antennae. 189, *I. pallipes*, ♂; 190, *I. nuba*, ♂; 191, *I. tomentosa*, ♂ holotype; 192, *I. albohirta*, ♂ paralectotype; 193, *I. arabica*, ♂ holotype; 194, *I. chapini*, ♂ lectotype; 195, *I. pallida*, ♂ holotype; 196, *I. natalensis*, ♂; 197, *I. velutina*, ♂; 198, *I. flavicornis*, ♂ holotype; 199, *I. oldroydi*, ♀ paratype; 200, *I. maritima*, ♂ lectotype; 201, *I. bezzii*, ♂ holotype; 202, *I. semiargentea*, ♂; 203, *I. lindbergi*, ♂ holotype. Scale: 0·5 mm.

13 Genae wide and with long whitish pile. Palpi with entirely whitish pile. (Rodrigues I.) . . . . **maritima** (p. 282)
– Genae with stiff black pile. Palpi at least partly with blackish pile . . . 14
14 Frontal pile not reaching below level of antennal bases. Style about one-third as long as third antennal segment (Text-fig. 201). Ground colour of mesonotum pale greyish. Tergites 2–4 thickly tomentose all over. (Rodrigues I.) **bezzii** (p. 284)
– Frontal pile reaching slightly below level of antennal bases. Style more than half as long as third antennal segment (Text-fig. 202). Ground colour of mesonotum brownish. Anterior corners of tergites 2–4 narrowly brownish black. (Cape Verde Is.) . . . . **semiargentea** (p. 285)

FEMALES

(The females of *albohirta*, *arabica*, *flavicornis* and *bezzii* are unknown.)

1 Frons with a blackish or brownish tomentose transverse area on upper part, which is clearly demarcated anteriorly from the pale tomentose lower part of frons (Text-figs 184–188) 2
– Frons nearly uniformly tomentose, at most with small and indistinctly demarcated areas of darker tomentum at eye-margins or along mid-line 9
2 Femora unicolorous yellowish to yellowish brown 3
– Femora unicolorous blackish to blackish brown or bicoloured 5
3 Frons comparatively narrow (as in Text-fig. 186). Anterior tergites blackish with posterior corners yellowish brown and without tomentum. (Madagascar) **oldroydi** (p. 280)
– Frons comparatively broad (Text-figs 187, 188). Tergites either almost uniformly brownish grey or with dull brownish areas on anterior tergites 4
4 Frons as in Text-fig. 188: the brownish frontal area only narrowly separated from antennal bases. Tergites uniformly brownish grey. Ground colour of wing brownish . . . . **pallida** (p. 272)
– Frons as in Text-fig. 187; the dark frontal area pale brownish, narrowly brownish black anteriorly, and broadly separated from antennal bases. Anterior tergites greyish brown laterally, posteriorly and along mid-line; the rest dull brownish. Ground-colour of wing whitish hyaline . . . . . . **natalensis** (p. 274)
5 Tergites 2–6 with blackish anterior bands and broadly greyish tomentose laterally and along posterior margins. In frontal view upper two-thirds of frons appearing dull blackish brown, lower third silvery greyish tomentose; in dorsal view entire frons appearing almost uniformly cinnamon-brown tomentose (Rodrigues I.) **maritima** (p. 282)
– Tergite 4 at most only greyish tomentose laterally, never along posterior margin, and often entirely shining black; tergites 5–6 not greyish tomentose at middle of posterior margins 6
6 Anterior margin of dark frontal area rather narrowly separated from antennal bases (Text-fig. 186). *Dc* setae absent 7
– Anterior margin of dark frontal area more broadly separated from antennal bases (Text-figs 184, 185). *Dc* setae present 8
7 Femora bicoloured. Tergites 4 and 7 not greyish tomentose laterally, i.e., entirely shining blackish. (Congo) . . . . **chapini** (p. 270)
– Femora unicolorous blackish grey. Tergites 4 and 7 very conspicuously greyish tomentose laterally. (Madagascar) . . . . **velutina** (p. 276)
8 First and third antennal segments long and slender (Text-fig. 192). Larger species: 9·9–11·6 mm. (C., E. and S. Africa) . . . . . . **tomentosa** (p. 263)
– First and third antennal segments shorter (Text-fig. 191). Smaller species: 7·7–9·1 mm. (NE. Africa) . . . . **nuba** (p. 260)

9 *Dc* setae present; 2 *sa* setae present. Femora brownish black. Palpus blackish haired . . . . **semiargentea** (p. 285) and **lindbergi** (p. 287)
– *Dc* setae absent; 1 *sa* seta present. Femora yellowish brown. Palpus whitish haired . . . . **pallipes** (p. 258)

Irwiniella pallipes (Kröber) **comb. n.**

(Text-figs 189, 204–210)

Psilocephala pallipes Kröber, 1912 : 117; Kröber, 1931 : 124. Syntypes ♂ ♀, SOUTH AFRICA: Cape Prov., Algoa Bay [lost].

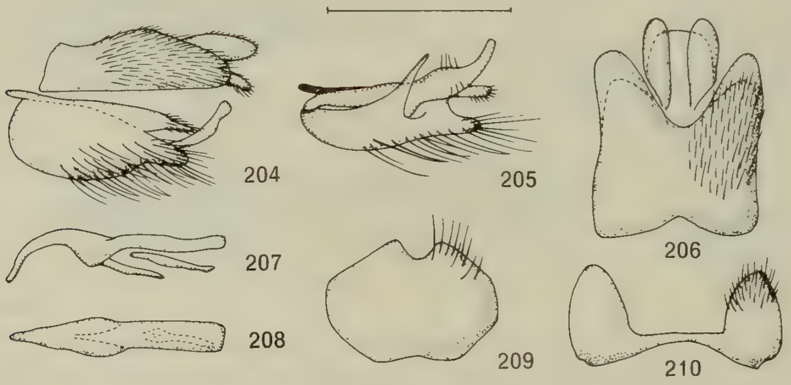
DIAGNOSIS. ♂. Frons with hairs. First antennal segment short and with short pile. Genae with short pile. About 2 × 8 setae on occiput. Mesonotum brownish grey, not distinctly banded; *dc* setae absent. Femora yellowish brown.

♀. Frons nearly uniformly tomentose, brownish grey along mid line, pure greyish laterally, not forming a distinctly transversely arranged pattern. Genae deep and brown. *Dc* setae absent; only 1 *sa* setae present. Tergite 5 uniformly greyish tomentose.

REDESCRIPTION. ♂. *Head* (Text-fig. 189). Facial index 0·70. Eyes separated for a distance equal to half width of anterior ocellus. Proboscis reaching to level of antennal bases. Palpi blackish brown with long whitish pile. Frons, face and occiput with thick whitish grey tomentum which has a slight brownish tinge on occiput. Frons with some very short hairs. Genae rather deep, mat blackish brown and with short black pile. Lower occiput with very long, whitish pile. On upper part of occiput only about 8 post-ocular and occipital setae on each side. First antennal segment dark with greyish tomentum and sparse and rather short pile. Second and third antennal segments brownish; style blackish. Third segment remarkably narrow apically. The two sections forming the style equally long.

Thorax. Mesonotum greyish and greyish brown tomentose, with very indistinct stripes and bands. Mesonotal pile rather long and pale. Pleura greyish tomentose with whitish pile on upper half of sternopleuron, on mesopleuron and metapleural callosity. Only 1 *sa* seta.

Wings. Cell M_3 open. Vein R_4 strongly curved. Ground colour whitish hyaline. Stigma and veins on basal and anterior parts of wing very pale brownish, on rest of wing blackish; veins closing second basal cell and also cross-veins slightly infuscate. Knob of halteres dirty yellowish brown.



FIGS 204–210. Male terminalia of *Irwiniella pallipes*. 204, genitalia in lateral view; 205, right gonocoxite in intero-ventral view; 206, epandrium in dorsal view; 207, aedeagus in lateral view; 208, aedeagus in dorsal view; 209, sternite 8; 210, tergite 8. Scale: 0·5 mm.

Legs. F_1 and f_2 without *av* setae. F_3 without or with 1–3 short *av* setae at apex. T_1 with 2–3 very strong, *ad*, *pd* and *pv* setae. Coxae greyish tomentose as pleura. Femora and tibiae yellowish brown, femora more or less distinctly darkened, and tibiae with darkened apices. Tarsi blackish except for most of metatarsi.

Abdomen. Ground-colour yellowish brown, distinctly translucent when seen from behind. Tergites with thin greyish tomentum and long adpressed white hairs. Sternites more brownish tomentose, especially on median parts.

Terminalia (Text-figs 204–210). Colour yellowish brown, only indistinctly tomentose, pile whitish. Epandrium as in Text-fig. 206. Stylus shaped as shown in Text-fig. 205. Ventral lobe short and pointed. Aedeagus with the phallic part (Text-fig. 207) comparatively long and gradually curved; seen dorsally (Text-fig. 208) of gradually decreasing width from base to tip. Dorsal apodeme in dorsal view (Text-fig. 208) narrow, and ventral apodeme short. Tergite 8: Text-fig. 210. Sternite 8: Text-fig. 209.

Total length 6·0–6·6 mm.

♀. *Head.* Facial index 0·79. Frons with a depressed, transverse area over middle entirely covered with pale greyish tomentum which has a slightly brownish tinge in a broad median band. Frontal pile short, sparse and composed of both blackish and yellowish hairs. Rest of head whitish grey tomentose except for the wide genae which are brownish black tomentose. Rest as in male, but third antennal segment appearing darker than in male.

Thorax. Mesonotum more distinctly striped than in male, i.e. with three broad brownish grey longitudinal bands which are separated by more pure greyish tomentose stripes. Rest of thorax including the chaetotaxy as in male.

Wings. These appear much darker than in male, as cross-veins are more broadly infuscate; also the longitudinal veins are surrounded by infuscate streaks. Otherwise as in male.

Legs as in male, but femora appearing slightly darker than tibiae.

Abdomen. Tergites 2–4 with broad and rather dull, dark brownish anterior bands, while posterior parts are pale greyish tomentose. The dark bands occupy less than one fourth of tergal length. Tergites 5–6 nearly totally pale greyish, tergite 6 with a dark brownish band on middle. Tergite 7 mostly dark brownish, only slightly tomentose laterally. Pile sparse and pale. 6 + 6 terminal spines which are rather broad and bluntly tipped.

Total length 6.8 mm.

REMARKS. Kröber described both sexes of *pallipes* on the basis of material from 'Algoa Bai' on the eastern coast of the Cape Province. The male syntype was stated to be in the Hamburg Museum, the female syntype in Kröber's own collection. Both may now be regarded as lost. If the female syntype was conspecific with the one of which he later (Kröber, 1931 : 124, fig. 12) figured the antenna, it is not conspecific with the male. Some of the specimens listed below come from the type-locality of *pallipes* and there can be no doubt about their identity.

DISTRIBUTION. The species seems restricted to the coastal plain of the eastern Cape Province.

MATERIAL EXAMINED.

SOUTH AFRICA: Cape Prov., Willowmore, 1 ♂, 1 ♀ (*Dr Brauns*) (TM); Port Elisabeth, Zwartkops River, coastal dunes, 4 ♂, 1 ♀, 29.x.1964 (*B. & P. Stuckenberg*) (NM & ZMC); Sand Flats, 1 ♀, 25.iii.1953 (*E. McC. Callan*) (NM); Port Alfred, 1 ♀, 24.iii.1957 (*E. McC. Callan*) (NM); East London, coastal dunes, 5 m, 9 ♂, 16.iii. 1972 (*M. E. & B. J. Irwin*) (MEI & ZMC); Paterson, sand dunes, 300 m, 89 ♂, 14 ♀, 15.iii.1972 (*M. E. & B. J. Irwin*) (MEI & ZMC).

Irwiniella nuba (Wiedemann) **comb. n.**

(Text-figs 183, 184, 190, 211–219)

Thereva Nuba Wiedemann, 1828 : 559; Kröber, 1912 : 116; Kröber, 1925 : 15. Holotype ♂, 'NUBIEN' (SMF) [examined].

Psilocephala nigrifrons Becker, 1902 : 34. Holotype ♂, EGYPT (ZMB) [examined]. [Synonymized by Kröber, 1912 : 116.]

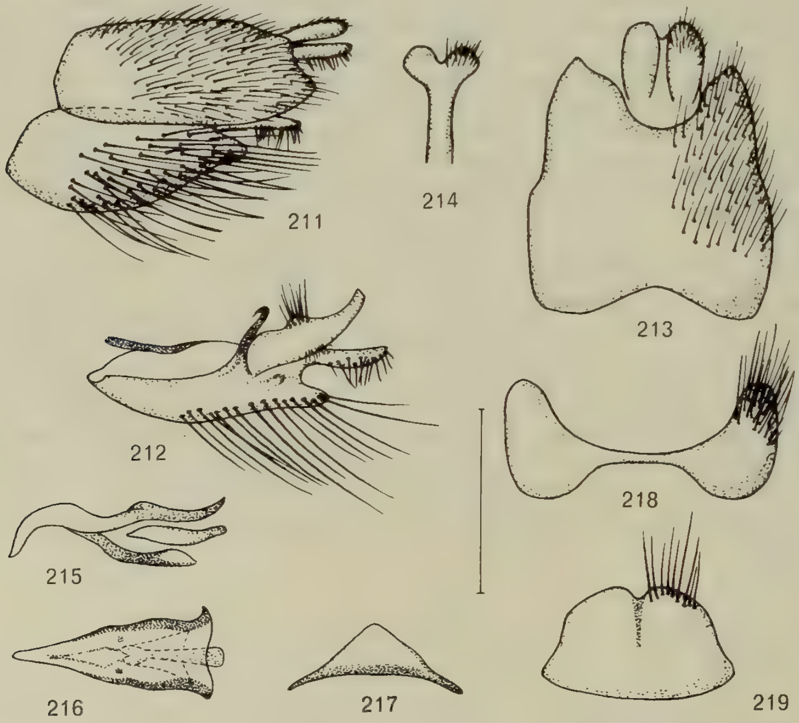
Psilocephala taeniata Becker, 1923 : 62; Kröber, 1931 : 125; Kröber, 1933 : 296. LECTOTYPE ♀, SUDAN (NMW), here designated [examined]. **Syn. n.**

Psilocephala sudanica Kröber, 1933 : 294. Holotype ♀, SUDAN (BMNH) [examined]. **Syn. n.**

DIAGNOSIS. ♂. Frons with hairs. First antennal segment with comparatively long pile, first and second segments narrow (Text-fig. 190). Genae bare. About 2 × 14 setae on occiput. Mesonotum with three brownish bands; *dc* setae present. Femora unicolorous. All tergites whitish grey tomentose and with whitish pile.

♀. Anterior margin of dark frontal area (Text-fig. 184) broadly separated from antennal bases. Tergite 4 blackish, at most only greyish tomentose laterally. Tergites 5–6 greyish with dark triangles on posterior margins. Smaller species: 7–9 mm.

REDESCRIPTION. ♂. *Head* (Text-figs 183, 190). Facial index 0.63. Eyes practically touching for a short distance. Proboscis reaching to level of middle of first antennal segment.



FIGS 211–219. Male terminalia of *Irwiniella nuba*. 211, genitalia in lateral view; 212, right gonocoxite in intero-ventral view; 213, epandrium in dorsal view; 214, paraproct; 215, aedeagus in lateral view; 216, aedeagus in dorsal view; 217, hypandrium; 218, tergite 8; 219, sternite 8. Scale: 0·5 mm.

Palpi shorter than proboscis and with whitish pile. Upper part of frons dull blackish, rest of frons and other parts of head silvery whitish grey tomentose. Frons with a few pale or dark hairs. Face and genae bare. Occiput with dense whitish pile. About 6 post-ocular and 8 occipital setae on each side. First antennal segment blackish, with greyish tomentum and with comparatively long black pile. Rest of antennae brownish black, palest at extreme base of third segment. Apical section of style about 4 times as long as basal section.

Thorax. Ground-colour of mesonotum greyish. A broad brownish band along mid line (width about 0·35 mm), and more laterally two brownish grey bands which are less distinct. Mesonotal pile rather long (0·25 mm) and consisting of both blackish and pale hairs. 1 pair of *dc* setae. Scutellum mainly greyish, only brownish on median anterior part. Its pile long and mainly whitish. Pleura whitish grey with long pale pile.

Wings. Cell M_3 closed at wing-margin. Vein R_4 with the proximal part straight, distal part curved. Colour hyaline with pale brownish tinge, veins blackish brown. Knob of halteres yellowish white, but blackish around base.

Legs. F_1 and f_2 with 1–3 *av* setae. F_3 with 4–6 *av* setae which are rather short, weak, and mainly situated in apical half; also with a row of much shorter *pv* setae in apical two-thirds. T_1 with 2–4 *ad*, *pd* and *pv* setae, some of which are longer than width of t_1. T_2 and t_3 with the usual rows of setae, but only a few of them strong. Coxae and femora with extensively greyish tomentum and pale pile. Tibiae and tarsi of p_1 brownish black, of p_2 and p_3 more yellowish brown, but distinctly darkened in apical parts. Claws and pulvilli small.

Abdomen. All tergites and sternites covered with whitish grey tomentum. Along anterior margin of tergites 2–3 with a narrow, shining blackish band laterally. Distinct whitish hind-marginal seams on most segments. Pile entirely whitish.

Terminalia (Text-figs 211–219). Both epandrium and gonocoxites greyish, the former with pale hairs, the latter with mixed pale and blackish hairs. Epandrium as in Text-fig. 213. Paraproct (Text-fig. 214) forming a heart-shaped structure which continues towards the rear into a narrow sclerite in the intersegmental membrane. Stylus (Text-fig. 212) simple. Ventral lobe (Text-fig. 212) narrow and rather short. Hypandrium (Text-fig. 217) comparatively large and rather strongly fused with the gonocoxites. Phallus in lateral view (Text-fig. 215) forming a rather thick tube which is gradually curved about 90 degrees. In dorsal view (Text-fig. 216) it gradually decreases in width towards the tip. Dorsal apodeme in lateral view (Text-fig. 215) rather flat and slightly upcurved, in dorsal view (Text-fig. 216) a little wider than proximal part of phallus, its distal margin with lateral hooks. Ventral apodeme shaped like a flat trough which gradually widens towards the distal end. Ejaculatory apodeme simple, as in figures. Tergite 8: Text-fig. 218. Sternite 8: Text-fig. 219.

Total length 6·6–8·2 mm.

♀. *Head* (Text-fig. 184). Facial index 0·63. Frons with a dull blackish transverse band, the anterior margin of which is broadly separated from antennal bases. The area above the band brownish, and the area below the band whitish grey tomentose as is also rest of head. Frontal pile sparse and consisting of very short blackish hairs which are situated on both the whitish and blackish areas. Head otherwise as in the male.

Thorax as in male, but the three brownish mesonotal bands more distinct and the pile shorter.

Wings and *legs* as described for male.

Abdomen. Tergites 2 and 3 with shiny blackish triangular bands which reach hind margin in midline and occupy half tergal length laterally. Tergite 4 shiny blackish, sometimes whitish grey tomentose postero-laterally. Tergites 5–6 mostly whitish grey tomentose and with a blackish triangular area on posterior margin. Tergite 7 as tergite 4. Pile short and pale on tergites 1–3, blackish on tergites 4–7. Sternites greyish tomentose, the pile of the same colour as on the corresponding tergites.

Ovipositor with 2 × 6 slender, pointed, black terminal spines.

Total length 7·1–9·1 mm.

REMARKS. Wiedemann described this species from a male specimen 'aus Nubien'.

The holotype is in the Senckenberg Museum, Frankfurt. It has lost the right third antennal segment, right hind tarsus, left p_2 and the abdomen except segment 1 and parts of segment 2. The wings are damaged posteriorly. The specimen agrees well with the description. It bears labels 'Abyssinia, Dr Rüppell' and '108', and has been labelled by Kröber (1911) as 'Psilocephala nuba Wied.'. Kröber (1912 : 117) also recorded a female specimen in the Vienna Museum as 'Type'. This specimen is labelled 'Natt., 1858, Egypt', and can therefore not be a syntype. I have removed the 'Type' label.

Psilocephala nigrifrons was described by Becker (1902 : 34) from 'Ein Männchen aus Aegypten in der Berl.zool.S. (Ehrenberg)'. The specimen is located in the Berlin Museum and bears two blue labels, 'Aegypt. Ehrbg.' and 'Psilocephala nigrifrons Becker', and a number '4152'. There is a fourth white label with 'Psilocephala nigrifrons Beck.'. The specimen is in fine condition and is conspecific with *nuba*. As it was not labelled as type, I have added a small circular 'Holotype' label. The synonymy with *nuba* was previously established by Kröber (1912 : 116).

Psilocephala taeniata was described by Becker (1923 : 62) from two female specimens. These are both in the Vienna Museum. The first specimen, labelled 'Bari, 6.–8.III.', is in rather good condition, although the third antennal segments, and right p_1 and p_3 are lost, and the wings are crumpled. The second specimen is labelled 'Sennar, 18.–24.II.' and is strongly discoloured. Both specimens come from 'Aegypt. Sudan' and were collected by Ebner in 1914. I hereby designate the specimen from Bari as the lectotype and have labelled it accordingly. The Sennar specimen is labelled as paralectotype. Becker's *taeniata* represents the female sex of Wiedemann's *nuba*.

Kröber (1933 : 296) recorded *taeniata* from specimens of both sexes originating from Sudan and deposited in the BMNH, and he gave a description of what he took to be the hitherto unknown male sex (= *nuba*). In the same paper Kröber described as new *Psilocephala sudanica* from a single female specimen. This is in the BMNH and has the following data: 'British Sudan, Sherdi, 1.II.1927, H. B. Johnston, Well. T.R.Labs, predatory on cotton aphids'. The specimen has lost both third antennal segments and all legs except right p_1. I have labelled it as holotype. I consider it to be conspecific with the types of *taeniata* and *nuba*.

The male specimen from Senegal recorded below is larger than specimens of *nuba* from NE. Africa. Its total length is 9·1 mm. The mesonotum is paler than in *nuba* and has a brownish band along the mid-line, while the lateral parts are only indistinctly greyish brown. Third antennal segment is also longer than in *nuba*. Tergite 2 has a distinct, though narrow, blackish basal band. The rest of the abdomen is completely discoloured. The terminalia are practically identical with the terminalia of an Egyptian *nuba* (Text-figs 211–219). This west African specimen may represent a distinct subspecies, but more material is needed for a description.

The flight period of *nuba* seems to be during the autumn and winter months, since all records are from the beginning of August to the beginning of March. The type of *sudanica* was stated to be predatory on cotton aphids. This is one of the very few records of the feeding activity of adult Therevidae (see comments on p. 254).

Distribution. The species seems to be widespread in the northern desert and semi-desert areas, from Sudan and Ethiopia in the north to Kenya in the south, and to the west as far as Chad and Nigeria, and perhaps to Senegal. In the north the area of distribution probably extends within the limits of present-day Egypt, though it is difficult to assess correctly old labels like 'Aegypten', 'Nubien' and 'Abyssinia'.

Material examined.

Holotype ♂ of *nuba*, 'Nubien', i.e. northern part of Sudan, the specimen labelled 'Abyssinia, Dr Rüppell' (SMF). Holotype ♂ of *nigrifrons*, 'Aegypten' (*Ehrbg.*) (ZMB). Lectotype ♀ of *taeniata*, Sudan: Bari, 6–8.iii.1914 (*Ebner*) (NMW). Holotype ♀ of *sudanica*, Sudan: Sherdi, 1.ii.1927 (*H. B. Johnston*) (BMNH). Paralectotype ♀ of *taeniata*, Sudan: Sennar, 18.–24.ii.1914 (*Ebner*) (NMW).

Egypt: 3 ♂, 1 ♀, 1858 (*Natt.*), as *Thereva annulata?* in Alte Sammlung, det. *Psilocephala nuba* by Kröber (NMW); 1 ♂, 1858, det *Psilocephala nuba* Wied., by Kröber (USNM). Sudan: Khartoum, 1 ♀, 17.ii.1926, in house (*H. W. Bedford*) (BMNH); Chartoum, 1 ♂ (*Vierthaler*, Coll. H. Loew) (ZMB); Ed Damer, Hudeiba, 1 ♂, 1 ♀, 7.i. & 4.xi.1961 (*H. Remane*) (ZSM). Ethiopia: Eritrea, Mareb Bridge, 1 ♂, 2.ix.1960 (*D. J. Greathead*) (DJG); Eritrea, Ailet, 1 ♀, 18.ii.1956, 1 ♀, 3.iv.1957 (*D. J. Greathead*) (DJG). Kenya: Nairobi, Zone H., HZS 3181, 2 ♀, 4.x.1951 & 29.xii.1951 (*L. C. Edwards*) (BMNH); Archer's Post, Ewaso Nyiro River at 700 m, 2 ♀, 6 & 12.xii.1969, in sandy area (*M. E. Irwin & E. S. Ross*) (MEI). Chad: Chari-Baquirni, 1 ♂, 4 ♀, 10–16.ii.1966 (*J. C. Hitchcock*) (USNM). Nigeria: 19 km WNW. of Lagos, 1 ♀, 2.viii.1963 (*J. Riley*) (BMNH). Without locality, 1 ♂ as *nubica* in Coll. H. Loew, nomen nudum (ZMB). Senegal: Dakar, 1 ♂, ix. 1949 (*A. Villiers*) (IFAN), see remarks.

Irwiniella tomentosa (Becker) **comb. n.**

(Text-figs 185, 191, 220–227)

Psilocephala tomentosa Becker, 1914 : 120. Holotype ♂, Tanzania (MP) [examined].

Psilocephala griseifrons Becker, 1914 : 121. Holotype ♀, Kenya or Tanzania (MP) [examined]. **Syn. n.**

Psilocephala meridionalis Kröber, 1933 : 293. LECTOTYPE ♂, Kenya (BMNH), here designated [examined]. **Syn. n.**

Diagnosis. ♂. Frons with hairs. First antennal segment (Text-fig. 191) with comparatively long pile. Mesonotum with a broad, brownish band; *dc* setae present. Lateral parts of tergite 4 with a tuft of long blackish hairs. Broad, blackish bands on tergites 2–4.

♀. Anterior margin of dark frontal area broadly separated from antennal bases. Tergite 4 almost entirely shining blackish.

Redescription. ♂. *Head* (Text-fig. 191). Facial index 0·60. Eyes practically touching for a short distance. Proboscis reaching a little beyond level of antennal bases. Palpi a little shorter than proboscis, brownish grey with whitish pile. Upper part of frons dull black. Rest of frons and other parts of head silvery whitish grey tomentose. Lower part of frons with some long blackish hairs which extend to about level of antennal bases. Genae and occiput with long and dense whitish pile. About 10–12 post-ocular and a similar number of occipital setae on each side. First antennal segment blackish, with greyish tomentum and long black hairs and setae. Second and third segments blackish, but more or less brownish on second and base of third segment. Apical section of style about twice as long as basal section.

Thorax. Ground colour of mesonotum dark greyish, partly subshining, along the mid-line with a broad, brownish band (width about 0·30 mm) flanked by pale greyish stripes. Mesonotal pile long (about 0·40 mm) and consisting of both blackish and whitish hairs. Scutellum greyish, with anterior median area more blackish; pile long and whitish. Pleura greyish with whitish pile. 1 pair of *dc* setae.

Wings. Cell M_3 normally closed at wing-margin. Vein R_4 with the proximal part straight, distal part curved. Colour hyaline, with a greyish brown tinge which may be rather distinct in streaks along the veins. Stigma brownish, veins dark brownish. Knob of halteres blackish.

Legs. F_1 and f_2 usually with a single *av* seta near middle. F_3 with 4–5 short and weak *av* setae in apical two-thirds and a row of much shorter *pv* setae. T_1 with only 2–3 *ad*, *pd* and *pv* setae, a few of which are longer than width of t_1. T_2 and t_3 with the normal four rows of setae. Coxae greyish. Femora blackish with comparatively thin greyish tomentum. Femoral pile long and whitish. T_1 entirely blackish brown. T_2 and t_3 more brownish, but often brownish black apically, or sometimes even intensely darkened all over as t_1. Tarsi coloured as their corresponding tribiae. Claws and pulvilli normal.

Abdomen. Tergites 2–4 with shining blackish anterior bands, the rest thickly covered with greyish tomentum. The blackish bands of tergites 2–3 occupying about half length of the tergites along the mid-line and only slightly narrow towards lateral margin. The blackish band of tergite 4 usually occupying less than half of tergal length, but this character rather variable. Other tergites entirely covered with greyish tomentum. Pile on tergites 1–3 long and entirely whitish. Pile on tergite 4 long and blackish on lateral margins, shorter and blackish on posterior margin, and whitish on rest of dorsal surface. Pile on tergites 5–7 entirely whitish, very long and erect on lateral margins. Yellowish white hind-marginal seams distinct on at least tergites 2–3. Sternites 1–4 mainly greyish tomentose, but more or less brownish black anteriorly. The following sternites mainly dark brownish, but more or less greyish on posterior margins. Pile on sternites exclusively whitish.

Terminalia (Text-figs 220–227). Epandrium and gonocoxites blackish, the former more or less greyish tomentose; pile on both structures blackish. Epandrium as in Text-fig. 225. Paraproct as in Text-fig. 224, i.e., continuing into a narrow sclerotization of the intersegmental membrane. Stylus as in Text-fig. 221. Ventral lobe short and narrow (Text-fig. 221). Phallus (Text-fig. 222) in lateral view forming a comparatively wide tube which is gradually curved for nearly 90 degrees; in dorsal view (Text-fig. 223) it narrows gradually. Dorsal apodeme (Text-fig. 222) with distal end upcurved, in dorsal view (Text-fig. 223) of gradually increasing width. Tergite 8: Text-fig. 226. Sternite 8: Text-fig. 227.

Total length 8·8–10·8 mm.

♀. *Head* (Text-fig. 185). Facial index 0·60. Frons with a dull blackish transverse band: the area above this band greyish brown, and the area below it silvery whitish tomentose like the rest of head. Frontal pile very short, blackish, and situated on both the whitish and blackish areas. Otherwise as in male.

Thorax. Chaetotaxy and colour as in male, but lateral areas of mesonotum darker and pile much shorter, adpressed and entirely black. Scutellum and pleura as in male, but pile shorter.

Wings. Cell M_3 open or closed. Colour with a more intensely brownish tinge than in male, especially in streaks along the veins. Other characters as in male.

Legs. F_1 and f_2 with 2–3 *av* setae. Femora more blackish and with shorter hairs, and t_2 and t_3 often intensely darkened on entire length. Otherwise as in male.

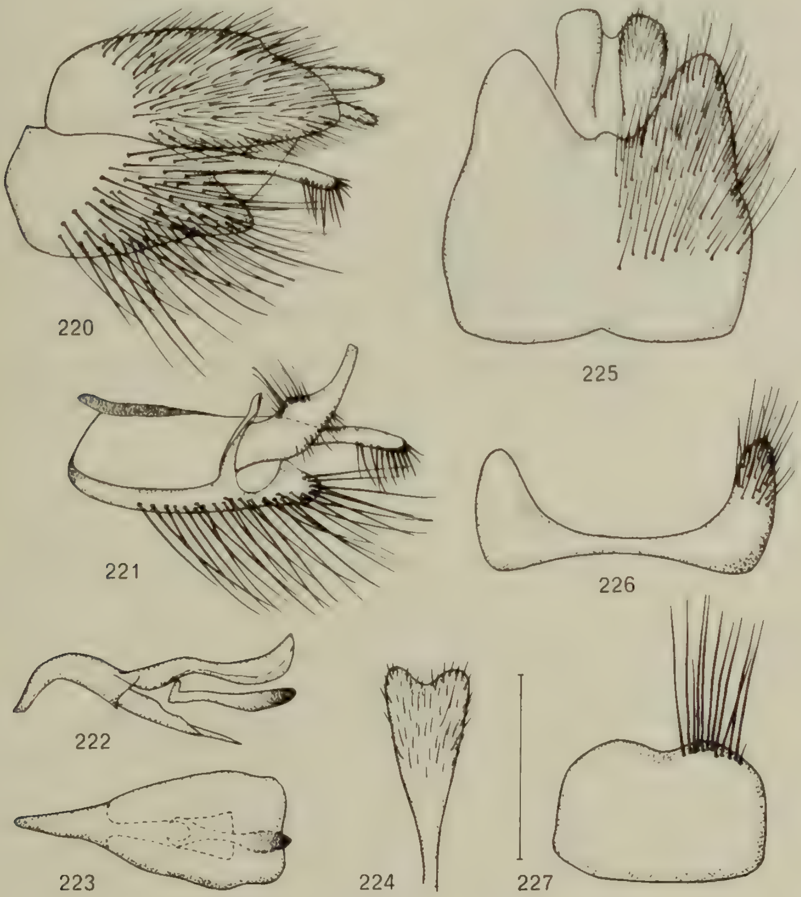
Abdomen. Tergites 2–3 shiny blackish with postero-lateral corners whitish grey tomentose; sometimes also hind margin tomentose. Tergites 4 and 7 totally black. Tergites 5–6 mostly whitish grey tomentose, more or less shiny black medially. Pile short, adpressed on tergites 1–4, more erect on the rest. Whitish in colour on the greyish areas of tergites 1–3, blackish on the rest. Sternites 1–4 greyish tomentose on posterior parts, more brownish black on anterior parts, but without a sharp line of demarcation. Other sternites brownish black and subshining.

Pile whitish on sternites 1–4, blackish on the rest. Ovipositor with 2 × 6 slender, pointed, black terminal spines.

Total length 9·9–11·6 mm.

REMARKS. *Psilocephala tomentosa* was described by Becker from a single male specimen from Bububu, Zanzibar, collected in April 1912 by Ch. Alluaud and R. Jeannel. The holotype is in the Paris Museum and is in rather good condition, though right p_2, parts of right p_3, and left p_2 are lost. It bears labels which correspond to the information given in the original short diagnosis in Latin.

In the same paper Becker described *Psilocephala griseifrons* from a female specimen, also collected by Alluaud and Jeannel in November 1911. The type-locality was given as 'rivière Ramisi'. I have not been able to find this locality on any



FIGS 220–227. Male terminalia of *Irwiniella tomentosa*, holotype. 220, genitalia in lateral view; 221, right gonocoxite in intero-ventral view; 222, aedeagus in lateral view; 223, aedeagus in dorsal view; 224, paraproct; 225, epandrium in dorsal view; 226, tergite 8; 227, sternite 8. Scale: 0·5 mm.

maps, but according to the labels on the holotype in the Paris Museum it is on the 'Côte d'Afrique or angl.', i.e. on the coasts of the African states Kenya or Tanzania. The holotype agrees well with the description and is in rather good condition, though the frons and abdomen are discoloured. This holotype represents the female sex of *tomentosa*.

Kröber's description of *meridionalis* was based on both sexes, and the types were stated to be in the BMNH. The syntypic series consists of a female specimen labelled 'Natal, Weenen, 2840 ft., I. 1924, H.P. Thomasset' and two male specimens labelled 'Dr van Someren, Rabai, May 1928'. This agrees with the information given by Kröber. Weenen is a locality some 100 km NNW. of Pietermaritzburg, Natal, and Rabai lies about 40 km NW. of Mombasa, Kenya. The female syntype, now labelled as paralectotype, is in good condition, though the right wing, right p_1 and p_3 and tibia and tarsus of left p_3 are lost. I hereby designate one of the male syntypes as lectotype of *meridionalis* and have labelled it accordingly. This lectotype has lost its antennae and right p_1 and p_3, and the right wing is curled, but otherwise it is in good condition. The second male syntype, now labelled as paralectotype, has lost its right third antennal segment and all legs except left p_3. The abdomen has been broken off, and is now glued to the thorax, but it is discoloured and crushed at tip.

The species has been collected in all months except June, July and August, but most specimens were taken in January. The species occurs both in sea-shore localities and in similar inland habitats like the shores of lakes and rivers. This is analogous to the common Palaearctic species, *Thereva annulata* (F.).

DISTRIBUTION. The species is widely distributed in Africa south of the equator: Kenya, Tanzania, Congo, Angola, Botswana, Zambia, Mozambique, Rhodesia, and South Africa (Transvaal, Natal and Cape Prov.).

MATERIAL EXAMINED.

Holotype ♂ of *tomentosa*, TANZANIA: Zanzibar, Bububu, st. 75, iv. 1912 (*Ch. Alluaud & R. Jeannel*) (MP). Holotype ♀ of *griseifrons*, TANZANIA or KENYA: 'Rivière de Ramisi', xi. 1911 (*Ch. Alluaud & R. Jeannel*) (MP). Lectotype ♂ of *meridionalis*, KENYA: Rabai, v. 1928 (*Dr van Someren*) (BMNH). Paralectotype ♂ of *meridionalis*, KENYA: same data as lectotype (BMNH). Paralectotype ♀ of *meridionalis*, SOUTH AFRICA: Natal, Weenen, 875 m, i. 1924 (*H. P. Thomasset*) (BMNH).

KENYA: Kilifi Dist., West end Blue Lagoon, 1 mile W. of Watamu, sea level, coastal beach association, 11 ♂, 6 ♀, larval skins and empty pupae, 1.i.1970 (*M. E. Irwin*) (MEI & ZMC). TANZANIA: Zanzibar, Nazi Moja, 1 ♂, x–xii. 1924 (*H. J. Snell*) (BMNH); Zanzibar, 1 ♂, i–ii. 1925 (*H. J. Snell*) (BMNH); Zanzibar, 1 ♀ (*E. de Ville*) (IRSNB); Dar es Salam, 1 ♀, 18.xi.1961 (*G. Heinrich*) (CNC); Tanga, 1 ♂, 15.xi.1966 (*D. O. Chanter*) (CNC); Molanje, 1 ♀, 7.ii.1913 (*S. A. Neave*) (BMNH); Chikala Dist., 1 ♀, i. 1913 (*Dr H. S. Stannus*) (BMNH); Ruo, 2 ♂, 13–15.v.1916 (*R. C. Wood*) (BMNH). ZAMBIA: SW. of Chilwa, 2 ♂, 1 ♀, 15.i.1914 (*S. A. Neave*) (BMNH). CONGO: 2 ♂ (*Dybowski*), 128–96 (MP). ANGOLA: Marimba, Kabisa (or Kibisa) River, lake shore, 2 ♂, 17.i. 1910 (*J. B. Davey*) (BMNH); C. Angontland, Luundi, 1 ♂, 27.i.1910 (*J. B. Davey*) (BMNH). BOTSWANA: Tsessebe, 1 ♀, i .1956 (*Zumpt*) (NM); Maun, 1 ♀, i. 1955 (NM). MOZAMBIQUE: Marromeu, Lower Zambesi River, Salone Forest, 1 ♀, xii. 1959 (*B. R. Stuckenberg*) (NM). RHODESIA, Lomagundi, 1 ♂, 22.ii.1940, Dept. Agric. (NM). SOUTH AFRICA: Transvaal, Lebombo Hills, 1 ♂ (*H. A. Junck*) (BMNH); Natal, Pietermaritzburg, 1 ♂, ix. 1956 (NM); Zululand, Mfongosi, 1 ♂, 1 ♀ (*W. E. Jones*) (SAM); Natal, Pinetown, 1 ♂, 20.i.1909 (*G. F. Leigh*) (TM); Cape Prov., Stellenbosch, 1 ♂, iii. 1915 (*Marley*) (SAM).

Irwiniella albohirta (Ricardo) **comb. n.**

(Text-figs 192, 228–235)

Psilocephala albohirta Ricardo, 1903 : 361; Kröber, 1912 : 137; Kröber, 1925 : 11; Kröber, 1933 : 289. LECTOTYPE ♂, SOCOTRA (BMNH), here designated [examined].

DIAGNOSIS. ♂. Frons bare. First antennal segment with comparatively long pile, third segment very narrow in apical half (Text-fig. 192). Genae with black pile. Mesonotum with a broad brown band; *dc* setae present. Femora unicolorous. All tergites whitish grey tomentose and with whitish pile.

♀. Unknown.

REDESCRIPTION. ♂. *Head* (Text-fig. 192). Eyes practically touching for a rather long distance. Upper facets enlarged. Proboscis short, not reaching to level of antennal bases. Palpi a little shorter than proboscis, dark brownish and with long whitish pile. Upper part of frons blackish or brownish, lower part of frons and face with dark greyish tomentum. Frons and face bare. Genae with a group of short black hairs. Occiput whitish grey tomentose below, more dark greyish above. Occipital pile moderately long and whitish. First antennal segment blackish, but brownish translucent at tip. Second and third segments brownish, apex of third segment and style darker. Third segment remarkably narrow in apical half, basal part only twice as broad as apical part. Apical section of style twice as long as basal section; pile on first segment comparatively long.

Thorax. Mesonotum with a broad brownish median band (width about 0·55 mm); lateral parts of mesonotum paler. Mesonotal pile consisting of rather long (0·15 mm) blackish hairs and more adpressed, golden brownish hairs, 1 pair of *dc* setae. Scutellum with dense whitish pile, especially on posterior margin. Pleura greyish tomentose and with long whitish pile.

Wings. Cell M_3 closed and short petiolate. Vein R_4 narrowly S-curved. Colour rather intensely brownish grey, with darker shadows around the cross-veins. Stigma brownish; veins strong and dark brownish, but pale brownish on anterior part of wing. Knob of halteres blackish brown.

Legs. F_1 and f_2 with 1–2 *av* setae. F_3 with 4–5 *av* setae in apical half. Coxae greyish tomentose. Ground-colour of femora brownish black, paler brownish towards tips of f_1 and f_2 and on apical ventral surface of f_3. F_1 and f_2 thinly greyish tomentose, f_3 hardly tomentose. Tibiae yellowish brown at base, becoming gradually more blackish brown towards tips. Tarsi blackish brown, only lighter brownish on basal part of metatarsus of p_1 and p_2. Claws and pulvilli normal.

Abdomen. All tergites covered with a rather thin layer of whitish grey tomentum, the brownish black ground-colour being visible in caudal view. Pile long and entirely whitish. Sternites coloured as tergites, but less tomentose. Hind-marginal seams whitish, and present on most segments.

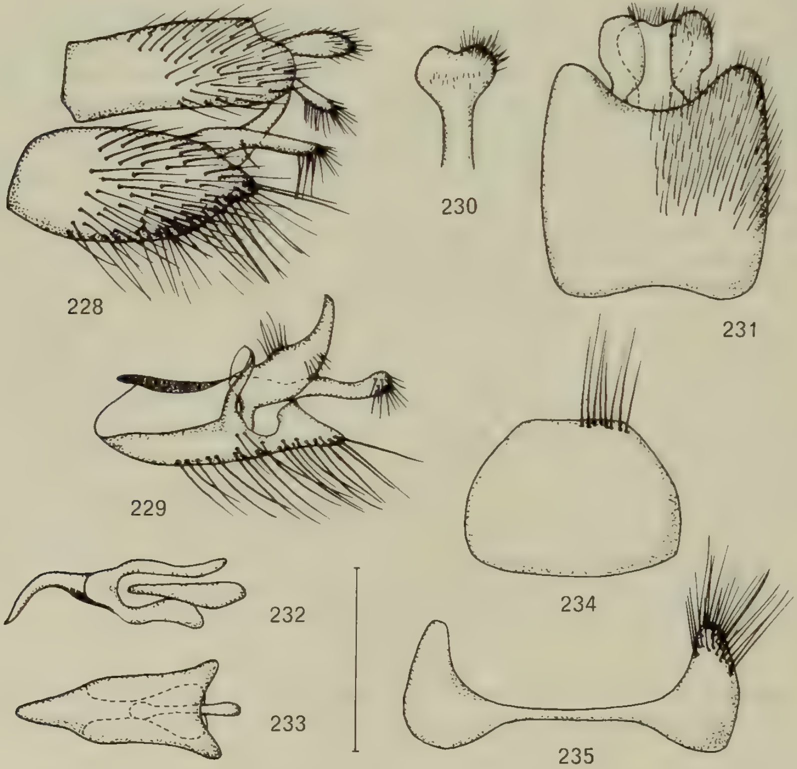
Terminalia (Text-figs 228–235). Blackish brown, epandrium paler brownish on posterior corners. Pile whitish on epandrium, blackish on gonocoxites. Epandrium as in Text-fig. 231. Paraproct (Text-fig. 230) forming a heart-shaped structure which continues into a narrow sclerotization of the intersegmental membrane. Distal end of dorsal gonocoxal process very long (Text-fig. 228). Stylus (Text-fig. 229) comparatively broad proximally. Hypandrium short and broad. Phallus in lateral view (Text-fig. 232) short and rather suddenly curved for less than 90 degrees; in dorsal view (Text-fig. 233) of almost the same shape as in *nuba*. The same is true of the dorsal, ventral and ejaculatory apodemes. Tergite 8: Text-fig. 235. Sternite 8 (Text-fig. 234) without incision on posterior margin.

Total length 9·0–9·4 mm.

♀. Unknown.

REMARKS. The species was described from two male specimens from Socotra. They are in the BMNH and are labelled 'Socotra, Homhil, 2500 ft., 26.i.1899, W. R. O. Grant'. The first specimen, originally labelled 'Type', has lost both third antennal segments, right t_1, tarsi of right p_3, and left p_2. The second specimen has only lost the tarsi of right p_3. Both specimens are discoloured on head, thorax and abdomen. The first-mentioned specimen is hereby designated as lectotype and has been labelled accordingly. The second specimen has been labelled as paralectotype.

The specimens were collected on a dry stony path near the summit of the limestone range of Homhil. The species appeared to be both local and rare. Most of the



FIGS 228–235. Male terminalia of *Irwiniella albohirta*, paralectotype. 228, genitalia in lateral view; 229, right gonocoxite in intero-ventral view; 230, paraproct; 231, epandrium in dorsal view; 232, aedeagus in lateral view; 233, aedeagus in dorsal view; 234, sternite 8; 235, tergite 8. Scale: 0·5 mm.

material recorded as *Thereva albohirta* by Kröber (1933 : 298) belongs to *Thereva analis*. True *albohirta* appear to be restricted to Socotra.

DISTRIBUTION. Probably endemic to Socotra.

MATERIAL EXAMINED.

Lectotype ♂, SOCOTRA: Homhil, 760 m, 26.i.1899 (*W. R. O. Grant*) (BMNH). Paralectotype ♂, same data as lectotype.

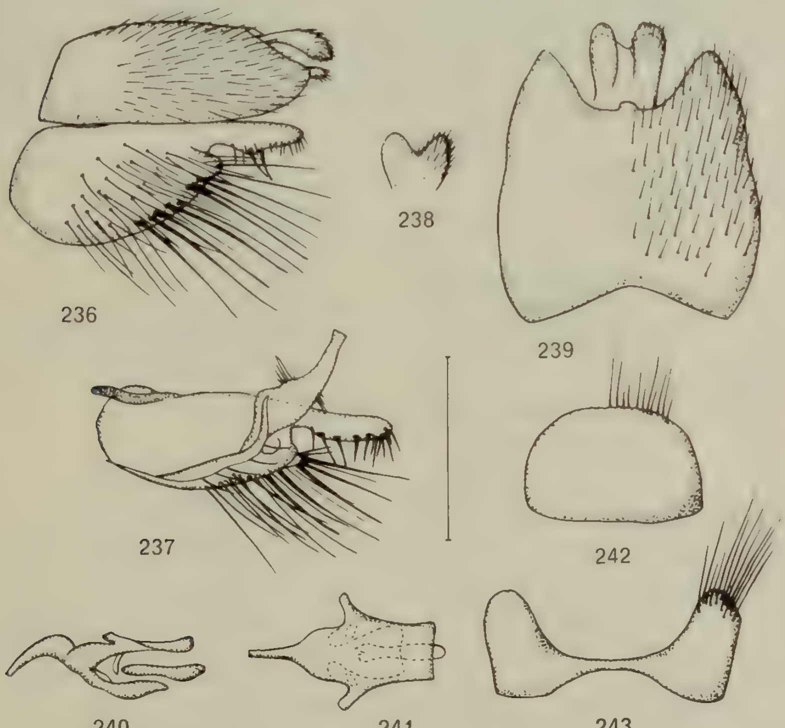
***Irwiniella arabica* sp. n.**

(Text-figs 193, 236–243)

DIAGNOSIS. ♂. Frons with hairs. First antennal segment (Text-fig. 193) with comparatively short pile. Genae bare. About 2 × 11 setae on occiput. Mesonotum with a broad, brown middle band; *dc* setae absent. Femora unicolourous. All tergites with whitish tomentum and pile.

♀. Unknown.

DESCRIPTION. ♂. *Head* (Text-fig. 193). Facial index 0·58. Eyes practically touching



FIGS 236–243. Male terminalia of *Irwiniella arabica*, holotype. 236, genitalia in lateral view; 237, right gonocoxite in intero-ventral view; 238, paraproct; 239, epandrium in dorsal view; 240, aedeagus in lateral view; 241, aedeagus in dorsal view; 242, sternite 8; 243, tergite 8. Scale: 0·5 mm.

for a short distance. Proboscis reaching to level of antennal bases. Palpi distinctly shorter than proboscis, brownish with thin whitish tomentum and long whitish pile. Frons whitish tomentose, upper corner dull blackish; with two lateral groups of 5–6 black hairs. Face, genae and occiput also whitish tomentose. Face and genae bare; occiput with whitish pile and about 11 post-ocular and occipital setae on each side. Antennae brownish black, first and second segments whitish tomentose, first segment with moderately long black pile. Apical section of style about twice as long as basal section.

Thorax. Mesonotum whitish grey with a broad brownish band (ca 0·40 mm) and also with narrower dark bands laterally. Mesonotal pile consisting of both erect black hairs and adpressed whitish hairs. Scutellum greyish with the central area brownish; the pile whitish. Pleura whitish grey with whitish pile. *Dc* setae absent.

Wings. Cell M_3 narrowly open. Vein R_4 rather strongly curved. Colour brownish hyaline, slightly more intensely coloured along the veins. Stigma and veins dark brownish. Halteres yellowish brown, base of knob darkened.

Legs. F_1 and f_2 with 1 *av* seta. F_3 with 3–5 rather short *av* setae, and a few much shorter *pv* setae near tip. T_1 with about 3 *ad*, *pd* and *pv* setae. Coxae whitish grey. Femora blackish brown and slightly tomentose. Pile mainly whitish, rather short and partly scaly. Tibiae and tarsi yellowish brown, darker brownish towards tips, especially on t_1. Claws and pulvilli small.

Abdomen. All tergites and sternites with whitish tomentum and pile, tergites 2 and 3 narrowly brownish laterally near anterior margin. Hind-marginal seams whitish.

Terminalia (Text-figs 236–243). Epandrium and gonocoxites yellowish brown, the former with whitish pile, the latter with blackish pile. Epandrium as in Text-fig. 239. Paraproct as in Text-fig. 238. Stylus (Text-fig. 237) rather broad proximally, becoming narrow towards tip. Ventral lobe short and narrow. Phallus in lateral view (Text-fig. 240) short and rather strongly curved, in dorsal view (Text-fig. 241) broad at base and becoming rapidly narrower towards the long and narrow tip. Dorsal apodeme in dorsal view (Text-fig. 241) with two lateral offshoots, which separate the species from all other Ethiopian species. Tergite 8: Text-fig. 243. Sternite 8: Text-fig. 242.

Total length 7·6 mm.

♀. Unknown.

MATERIAL EXAMINED.

Holotype ♂, SOUTHERN YEMEN: Lahoj, 19.ii.1895 (*C. G. Nurse*) (BMNH).

Irwiniella chapini (Curran) **comb. n.**

(Text-figs 194, 244–250)

Psilocephala chapini Curran, 1928 : 173; Kröber, 1933 : 295; Kröber, 1936 : 255. Holotype ♂, ZAIRE (AMNH) [examined].

Psilocephala pallidicornis Kröber, 1931 : 123. Holotype ♂, ZAIRE (ZIH) [examined]. **Syn. n.**

DIAGNOSIS. ♂. Frons with hairs. First antennal segment (Text-fig. 194) with comparatively short pile. Antennae yellowish. Genae narrow and with very short, blackish hairs. About 2 × 13 setae on occiput. Mesonotum with a broad, brown band; *dc* setae absent. Wings intensely brownish coloured. Femora bicoloured. All tergites entirely whitish grey tomentose, but tomentum thin on apical segments.

♀. Anterior margin of dark frontal area almost reaching to antennal bases (as in Text-fig. 186). First antennal segment long and with short pile. Femora bicoloured.

REDESCRIPTION. ♂. *Head* (Text-fig. 194). Eyes practically touching for rather a long distance. Proboscis reaching to level of antennal bases. Palpi much shorter than proboscis, dark brownish with whitish pile. Frons largely dull blackish, lateral parts of lower frons and also face whitish grey tomentose. Two lateral groups of short, black frontal hairs. Genae narrow and dark brownish, with very short, black hairs. Occiput entirely greyish tomentose; on lower part with long whitish pile; above with about 13 post-ocular and occipital setae on each side. Antennae yellowish brown, apex of third segment and style darkened. First segment with short and sparse black pile. Apical section of style twice as long as basal section.

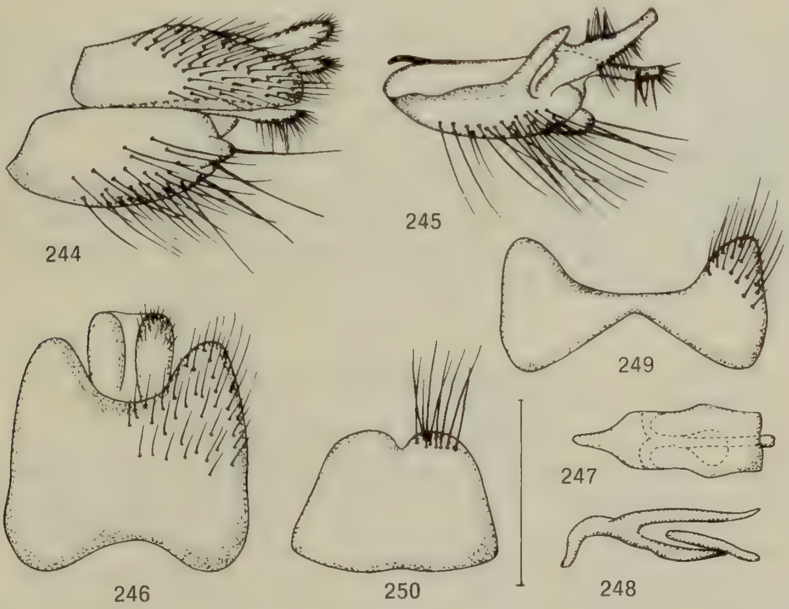
Thorax. Mesonotum with a broad dark brownish median band (ca 0·40 mm), flanked by two narrower pale greyish stripes. The areas situated laterally of these stripes darker greyish brown. Mesonotal pile short, adpressed and rather pale. Scutellum greyish with pale hairs. Pleura pale greyish, with sparse whitish pile. *Dc* setae absent.

Wings. Cell M_3 broadly open. Vein R_4 with an almost straight proximal part; distal part curved. Colour intensely brownish all over and with areas of still darker brownish colour. These areas include the stigma, a streak from anterior cross-vein to apex of discal cell, and streaks along the longitudinal veins, especially in apical part of wing. Halteres yellowish.

Legs. F_1 with 1–4 *av* setae. F_2 without av setae. F_3 with 4–5 short *av* setae and some still shorter pv setae along most of length. T_1 with 2–4 *ad*, *pd* and *pv* setae. Setae on t_2 strong but few, only 2–3 in each of the four rows. T_3 missing in the two males available for study. Coxae intensely greyish tomentose, their ground-colour brownish black. Femora bicoloured, most conspicuously on f_1 and f_2 where apical fourth to half is yellowish brown, the rest being blackish brown and only thinly tomentose. F_3 less distinctly bicoloured. Femoral pile mainly whitish and rather long. T_1 and fore tarsi blackish. T_2 and mid tarsi yellowish brown. Claws and pulvilli small.

Abdomen. All tergites entirely whitish grey tomentose, though thinly tomentose on the apical tergites which are therefore distinctly yellowish translucent on postero-lateral parts. Pile entirely whitish. Sternites 1–4 appearing whitish grey tomentose when seen from in front, the following sternites dull brownish.

Terminalia (Text-figs 244–250). Epandrium and gonocoxites yellowish brown and with



FIGS 244–250. Male terminalia of *Irwiniella chapini*, holotype. 244, terminalia in lateral view; 245, right gonocoxite in intero-ventral view; 246, epandrium in dorsal view; 247, aedeagus in dorsal view; 248, aedeagus in lateral view; 249, tergite 8; 250, sternite 8. Scale: 0·5 mm.

blackish pile. Epandrium as in Text-fig. 246. Paraproct weakly sclerotized; no sclerotization of the intersegmental membrane. Stylus and ventral lobe (Text-fig. 245) comparatively long and slender. Hypandrium broad and very short. Phallus in lateral view (Text-fig. 248) forming a short, rather wide tube which is curved for nearly 90 degrees; in dorsal view (Text-fig. 247) it is broad proximally and narrows rapidly into a slender apical part. Dorsal apodeme (Text-fig. 248) straight and flat, in dorsal view (Text-fig. 247) with two low lobes on lateral margin. Tergite 8: Text-fig. 249. Sternite 8: Text-fig. 250.

Total length 7·2–7·8 mm.

♀. *Head*. Facial index 0·59. Frons with a large, dull blackish area, the anterior margin of which projects to form an obtuse angle and nearly reaches the antennal bases (cf. Text-fig. 186). Upper part of frons dark greyish tomentose. Two rows of short frontal hairs above. Lateral parts of lower frons and face whitish grey tomentose and bare. Head otherwise as in male.

Thorax, *wings* and *legs* as in male.

Abdomen. Pattern on tergites basically as in *velutina*, but tergite 1 more intensely darkened on middle, and tergites 4 and 7 not tomentose laterally nor when seen in lateral view. Only sternites 1–3 partly greyish tomentose, the following sternites being dark brownish and subshining. Terminal spines of ovipositor very slender and pointed.

Total length 8·9–10·5 mm.

REMARKS. The species was described from one male and three female specimens from Banana in Congo, collected in July-August 1915 (not 1916 as stated by Curran). Curran designated the male as holotype. The holotype, a female specimen labelled 'Type' (allotype) and a further female paratype are located in the American Museum of Natural History, New York. The fourth specimen, a female paratype, is in Musée Royal de l'Afrique Centrale, Tervuren, Belgium.

MATERIAL EXAMINED.

Holotype ♂ of *chapini*, ZAIRE: Banana, 6°S. 12°20′E., vii. 1915 (*Lang & Chapin*) (AMNH). Holotype ♂ of *pallidicornis*, ZAIRE: Cabinda, 14.vii.1892 (*v. Röder*), (ZIH). Paratypes of *chapini*, ZAIRE: same locality as holotype, 3 ♀, 9.vii.1915, 5.viii.1915 and viii. 1915 (*Lang & Chapin*) (AMNH & MCT).

ZAIRE: Mayumbe Lemba, 1 ♂, 1–10.xii.1915 (*R. Mayné*), det. *Psilocephala chapini* Curr. by Kröber, 1935 (MCT); Boma, 1 ♂, 5.viii.1920 (*H. Schouteden*), det. *Psilocephala chapini* Curr. by Kröber, 1935 (MCT); Mayumbe, Buku Zambe, 1 ♀, 9.x.1924 (*A. Collart*), det. *Psilocephala chapini* Curr. by Kröber, 1935 (MCT).

Irwiniella pallida **sp. n.**

(Text-figs 188, 195, 251–257)

DIAGNOSIS. ♂. Frons without hairs. First antennal segment with comparatively short pile (Text-fig. 195). Genae bare. About 2 × 12 setae on occiput. Mesonotum with a broad, brown band; *dc* setae present. Femora and tergites uniformly yellowish brown, thinly tomentose and with whitish pile.

♀. Frons (Text-fig. 188) very broad and with a large dark brownish area. Abdomen uniformly dirty yellowish brown.

DESCRIPTION. ♂. *Head* (Text-fig. 195). Facial index 0·79. Eyes practically touching for rather a long distance; upper facets distinctly enlarged. Proboscis very short, not reaching to level of antennal bases. Palpi as long as proboscis, yellowish, with whitish hairs; some black hairs at tip. Genae broadly rounded, not ridge-shaped as in *nuba*. Upper half or more of frons and genae dull dark cinnamon-brown, an area above antennal bases silvery greyish tomentose with yellowish tinge; face with golden brownish tomentum. Frons, face and genae bare. Occiput whitish grey tomentose and with whitish pile. About 12 post-ocular and occipital setae on each side. Antennae brownish, first segment with yellowish grey tomentum and with a few rather strong setae and some blackish hairs; style darkened. Apical section of style only slightly longer than basal section.

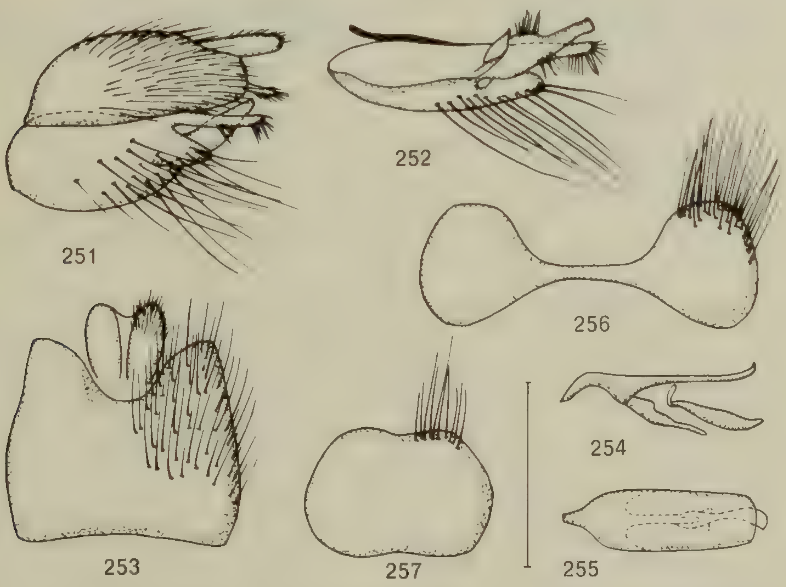
Thorax. Mesonotum greyish brown, with a dark brownish median band and two less distinct brownish stripes laterally. Mesonotal pile consisting of both blackish and pale hairs. Scutellum greyish brown and with whitish pile. Pleura thinly greyish tomentose and with whitish pile. 2 pairs of *dc* setae.

Wings. Cell M_3 broadly open. Vein R_4 with a straight proximal part, distal part curved. Colour uniformly greyish hyaline. Stigma faintly brownish, veins brownish. Halteres entirely yellowish.

Legs. F_1 and f_2 without setae. F_3 with about 5 *av* setae in apical half, and some much shorter *pv* setae. T_1 with 2–3 *ad*, *pd* and *pv* setae, of which only the *ad* are longer than width of tibia. T_2 with 3–4 *ad*, *pd*, *av* and *pv* setae, of which those in the two posterior rows are short. T_3 with setae in all four positions, but *pv* setae very short. Femora, tibiae and tarsi yellowish to yellowish brown, femora with only indistinct tomentum and whitish pile. Claws and pulvilli normal.

Abdomen. All tergites and sternites entirely pale yellowish brown, without pattern, and covered with long dense whitish pile.

Terminalia (Text-figs 251–257). Epandrium and gonocoxites yellowish brown, and with whitish pile like the rest of the abdomen, with only some black hairs on posterior part of gonocoxites. Epandrium as in Text-fig. 253. Paraproct weakly sclerotized as is the intersegmental membrane. Gonocoxite (Text-fig. 251) with posterior margin projecting and bearing



FIGS 251–257. Male terminalia of *Irwiniella pallida*, holotype. 251, genitalia in lateral view; 252, right gonocoxite in intero-ventral view; 253, epandrium in dorsal view; 254, aedeagus in lateral view; 255, aedeagus in dorsal view; 256, tergite 8; 257, sternite 8. Scale: 0·5 mm.

a long dorsal gonocoxal process at distal end, the apex of which projects beyond the posterior corner of epandrium. Stylus in ventral view (Text-fig. 252) with a thickened tip with a small hook. Phallus (Text-fig. 254) very short and rather abruptly curved for about 60 degrees; in dorsal view (Text-fig. 255) broad proximally and narrowing rapidly. Dorsal apodeme flat and rectangular, only a little narrower towards distal end. Tergite 8: Text-fig. 256. Sternite 8: Text-fig. 257.

Total length 8·2 mm.

♀. *Head* (Text-fig. 188). Facial index 0·70. Frons broad and largely occupied by a dull dark brownish area. Lower frons with a yellowish grey tomentose transverse band. Upper part of occiput more brownish grey tomentose than in male. Other characters as in male.

Thorax. Mesonotum dull brownish with three paler greyish brown stripes, one narrow, one along the mid-line and two slightly broader ones more laterally. Anterior and lateral areas of mesonotum also more greyish brown. Mesonotal pile pale. Scutellum greyish brown with whitish pile. Pleura more whitish grey tomentose, but still with a brownish tinge. One pair of *dc* setae.

Wings. Cell M_3 and vein R_4 as in male. Colour darker than in male, as the ground-colour is distinctly greyish brown and darker brownish shadows are present around tips of basal and discal cells and around fork of veins R_4 and R_5.

Legs. F_1 with a single *av* seta near middle. F_2 without setae. F_3 with the same chaetotaxy as in male. Rest as in male.

Abdomen. All tergites and sternites with an almost uniformly dirty greyish brown colour; very thinly tomentose but appearing subshining. Without any distinct pattern. Pile short, sparse and pale. 6–7 terminal spines which are long and rather blunt-tipped.

Total length 9·1 mm.

MATERIAL EXAMINED.

Holotype ♂, MOZAMBIQUE: Delagoabai (*R. Monteiro*) (ZMB).

Paratypes. SOUTH AFRICA: Zululand, Dukuduku between St Lucia & Matubatuba, 1 ♀, 7–8.iv.1960 (*B. & P. Stuckenberg*) (NM); Zululand, Manguzi River, nr Maputa, 1 ♂, 1 ♀, xi–xii. 1945 (*H. W. Bell Marley*) (DM).

Irwiniella natalensis (Kröber) **comb. n.**

(Text-figs 187, 196, 258–264)

Psilocephala natalensis Kröber, 1914 : 37; Kröber, 1931 : 123. Holotype ♂, SOUTH AFRICA (destroyed).

DIAGNOSIS. ♂. Frons without hairs. First antennal segment with comparatively short pile (Text-fig. 196) and third segment with the apical part very slender. Genae bare or with a few pale hairs behind. About 2 × 10 setae on occipiut. Mesonotum with three distinct broad brownish grey bands; *dc* setae present. Femora greyish black with yellowish brown tips. Tergites whitish grey.

♀. Frons broad; its upper half (Text-fig. 187) pale brownish, but with narrow blackish brown band descending down to the greyish tomentose lower half of frons. Abdomen greyish to greyish brown, with darker brownish dull areas on anterior tergites.

REDESCRIPTION. ♂. *Head* (Text-fig. 196). Facial index 0·74. Eyes narrowly separated by one-third to half width of anterior ocellus. Upper facets slightly enlarged. Proboscis short, not reaching to level of antennal bases. Palpi almost as long as proboscis, greyish or slightly yellowish brown, with whitish hairs only. Genae evenly rounded, bare, or with a few white hairs behind. Frons largely silvery greyish tomentose, only extreme upper part dark greyish or brownish. Face silvery greyish tomentose, with a yellowish tinge on middle. Genae dull greyish black. Frons and face bare. Occiput entirely whitish grey tomentose and with whitish pile; 8–11 post-ocular and occipital setae on each side. Antennae brownish, first and second segments with pale tomentum, thus appearing whitish grey to yellowish grey. Third segment may be darker brownish; characterized by the almost circular basal part and the narrow apical part. Style darkened, apical section 4–5 times as long as basal section.

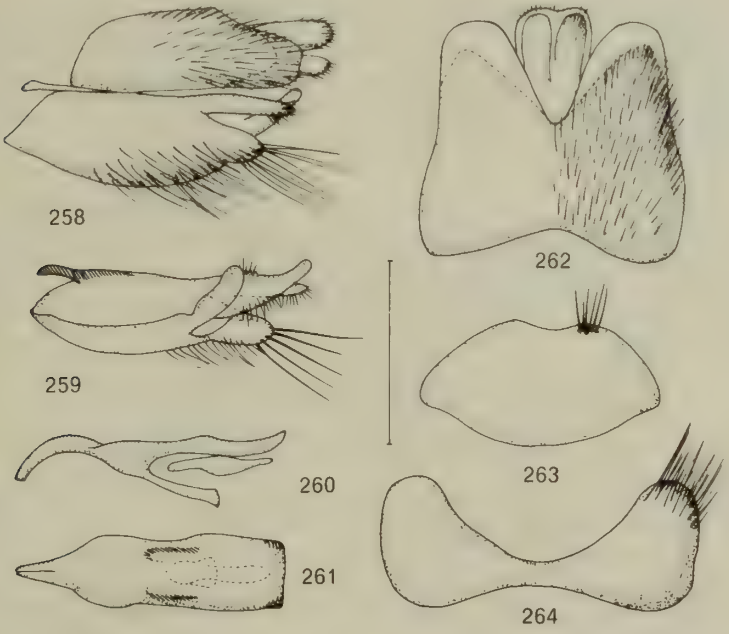
Thorax. Mesonotum pale greyish in ground-colour, with three distinct broad brownish grey bands, the lateral bands being interrupted on posterior part. Median band with a more or less distinct paler greyish mid-line. Mesonotal pile consisting of both pale and black hairs. Scutellum greyish with a brownish middle part, with whitish pile. Pleura greyish tomentose, the tomentum often with a brownish tinge on mesopleuron and sternopleuron; pile whitish. Usually 2 pairs of *dc* setae. Number of *sa* setae varying from 1 to 2, even in the same specimen.

Wings. Cell M_3 closed to broadly open. Vein R_4 rather strongly S-curved. Ground-colour rather variable, from almost whitish grey to more brownish grey. Wings strongly marked, partly due to very dark veins on the posterior part, and partly due to clouding around the veins; the cross-veins, fork of veins R_{4+5}, apex of vein R_1 and apex of cell M_3 in particular have strongly infuscate areas, whereas the stigma is remarkably pale brownish and very indistinct. Halteres with whitish yellow knob.

Legs. F_1 and f_2 with 1 or 2 short *av* setae. F_3 with 6–7 short *av* setae on apical two-thirds. T_1 with 3–4 *ad* and 2–3 *pd* and *pv* setae; t_2 with 2–4 *ad*, *pd*, *av* and *pv* setae. T_3 with rather numerous setae in all four positions, *pv* setae also well-developed. Femora blackish with yellowish brown tips, distinctly greyish tomentose. Femora and tarsi yellowish brown, tips of t_2 and t_3 and also the last tarsal segments darkened.

Abdomen. Tergites whitish grey tomentose, tergite 1 often with more or less brownish tomentum. Sternites greyish. Pile rather sparse, short and entirely whitish.

Terminalia (Text-figs 258–264). Epandrium and gonocoxites greyish and with mainly



Figs 258–264. Male terminalia of *Irwiniella natalensis*. 258, genitalia in lateral view; 259, right gonocoxite in intero-ventral view; 260, aedeagus in lateral view; 261, aedeagus in dorsal view; 262, epandrium in dorsal view; 263, sternite 8; 264, tergite 8. Scale: 0·5 mm.

whitish pile, with some long black hairs only on posterior part of gonocoxites. Epandrium as in Text-fig. 262, with a remarkably broad lamellate posterior margin free of pile. Paraproct weakly sclerotized as is the intersegmental membrane. Gonocoxite (Text-fig. 258) with posterior margin projecting. Distal end of dorsal gonocoxal process (Text-fig. 258) long, but only slightly projecting beyond posterior margin of gonocoxite (compare with *pallida* (Text-fig. 251)). Stylus (Text-fig. 259) rather short and thick basally. Phallus (Text-fig. 260) rather long and strongly curved, in dorsal view (Text-fig. 261) decreasing gradually in width. Dorsal apodeme (Text-fig. 260) straight and flat, in dorsal view (Text-fig. 261) almost rectangular. Tergite 8: Text-fig. 264. Sternite 8: Text-fig. 263.

Total length 7·8–8·3 mm.

♀. *Head* (Text-fig. 187). Facial index 0·87. Frons very broad and with an irregular narrow transverse brownish black band on middle. The area above this band pale brownish tomentose, and the area below it greyish tomentose like the face. Upper part of occiput more greyish brown tomentose than in male and with 13–14 post-ocular and occipital setae. Other characters as in male.

Thorax. Mesonotum with the same pattern as in male, scutellum more brownish than in male. Otherwise as in male.

Wings and *legs* as in male, except the femora entirely yellowish brown. Both females available with cell M_3 broadly open.

Abdomen. Tergite 1 greyish brown tomentose. Tergites 2–4 greyish brown tomentose laterally, along posterior margin and on a broad mid-line; the rest of these tergites dark brownish tomentose on two large well-separated areas. The following tergites greyish brown tomentose, slightly darker medially than laterally. Sternites almost uniformly greyish brown. Abdominal pile short and pale yellowish. 7 + 7 very long and slender terminal spines.

Total length about 10 mm.

REMARKS. Kröber described this species from a single male specimen from 'Port Durban, Natal, 28.Juli'. The holotype was stated to be in 'Koll. Bequaert, Brüssel'. It was destroyed during the 1914–18 war, according to a letter kindly sent to me by Dr Bequaert. No other specimens were available until Dr M. E. Irwin collected a good series of the species in 1971.

MATERIAL EXAMINED.

SOUTH AFRICA: Natal, Amanzimtobi, coastal dunes, 9 ♂, 2 ♀, 18.ix.1971 (*M. E. Irwin*) (NM & ZMC); Natal, Umhlanga Rocks, coastal dunes, 1 ♂, 24.x.1971 (*M. E. Irwin*) (NM); Natal, St Lucia Estuary, coastal dunes, 3 ♂, 24.xi.1971 (*M. E. Irwin*) (NM).

Irwiniella velutina (Kröber) **comb. n.**

(Text-figs 186, 197, 265–271)

Psilocephala velutina Kröber, 1912 : 124; Kröber, 1929 : 424; Kröber, 1931 : 124. LECTOTYPE ♂, MADAGASCAR (USNM), here designated [examined].

DIAGNOSIS. ♂. Frons bare and high. First antennal segment (Text-fig. 197) with short pile. Genae narrow and bare. About 2 × 10 setae on occiput. Mesonotum with a narrow brown stripe along mid-line; *dc* setae absent. Femora unicolourous. All tergites with whitish tomentum and pile.

♀. Anterior margin of dark frontal area almost reaching antennal bases (Text-fig. 186).

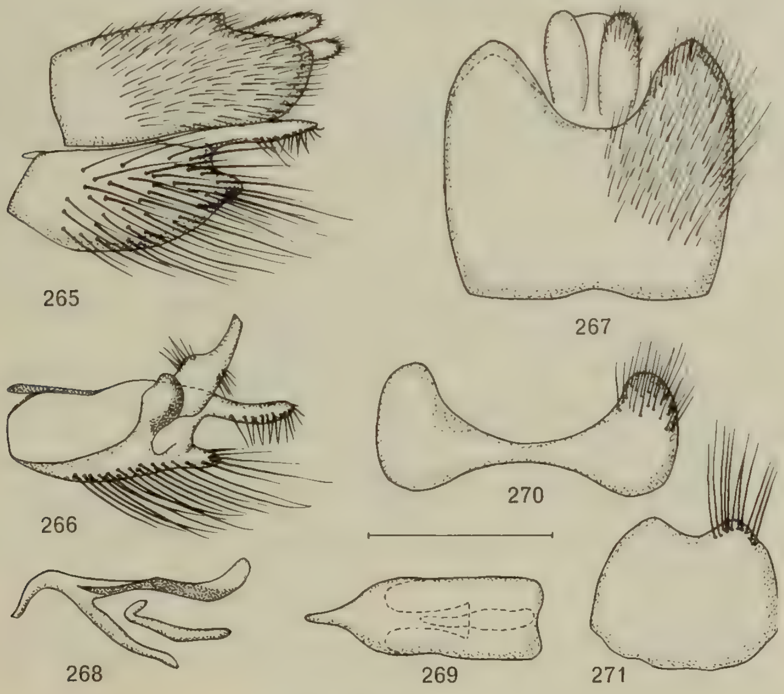
REDESCRIPTION. ♂. *Head* (Text-fig. 197). Facial index 0·58. Eyes practically touching for rather a long distance. Proboscis reaching to level of apex of first antennal segment. Palpi much shorter than proboscis, greyish, with whitish pile. Upper part of frons dull blackish, rest of frons and other parts of head silvery whitish grey tomentose. Frons, face and genae bare. Occiput with long whitish pile. About 10 post-ocular and occipital setae on each side, forming a continuous row; in some specimens a few additional setae below the upper post-oculars. First antennal segment greyish tomentose and with rather few, short, black hairs. Second and third antennal segments brownish black, apex of third segment and style black. Apical section of style about 5 times as long as basal section.

Thorax. Mesonotum whitish grey tomentose all over; with two indistinct, paler tomentose stripes and a narrow brownish tomentose stripe (width ca 0·05 mm) along mid-line. Pile rather short (0·15–0·20 mm) and consisting of mixed blackish and whitish hairs, the whitish ones situated mainly laterally. Scutellum greyish with whitish pile. Pleura whitish grey tomentose and with whitish pile. *Dc* setae absent.

Wings. Cell M_3 closed or narrowly open. Vein R_4 with proximal part straight; distal part curved. Colour hyaline with a greyish brown tinge, most intensely along the veins which are blackish. Stigma dark brownish. Knob of halteres brownish, but blackish around base.

Legs. F_1 and f_2 with 1–2 *av* setae. F_3 with about 4 short and weak *av* setae in apical half and a number of still shorter *pv* setae in about apical two-thirds. T_1 with 2–4 *ad*, *pd* and *pv* setae. T_2 and t_3 with the usual four rows of setae, the *pv* setae on t_3 being the shortest. Coxae and femora blackish with greyish tomentum and whitish pile. Tibiae mainly brownish, but t_1 extensively darkened in apical half or more, and t_2 and t_3 darkened at tips. Tarsi mainly blackish, metatarsi more or less brownish in basal parts. Claws and pulvilli normal.

Abdomen. All tergites intensely silvery whitish tomentose and with entirely whitish pile. Narrow whitish hind-marginal seams distinct on most segments. Sternites 1–4 whitish grey tomentose and with whitish pile, sternites 5–7 brownish grey with blackish pile.



FIGS 265–271. Male terminalia of *Irwiniella velutina*. 265, genitalia in lateral view; 266, right gonocoxite in intero-ventral view; 267, epandrium in dorsal view; 268, aedeagus in lateral view; 269, aedeagus in dorsal view; 270, tergite 8; 271, sternite 8. Scale: 0·5 mm.

Terminalia (Text-figs 265–271). Epandrium and gonocoxites blackish, epandrium partly tomentose, both with entirely blackish pile. Epandrium as in Text-fig. 267; its posterior corners broadly rounded and narrowly lamellate. Paraproct almost as in *nuba*. Stylus (Text-fig. 266) comparatively short, the lobe on middle of dorsal margin very low. Hypandrium taking the form of a rather broad but very short sclerite which is rather strongly fused to anterior ventral margins of gonocoxites. Phallus in lateral view (Text-fig. 268) forming a short narrow tube; in dorsal view (Text-fig. 269), broad proximally and tapering gradually. Dorsal apodeme (Text-fig. 268) straight and flat, with distal margin upcurved; in dorsal view (Text-fig. 269) with sidemargins parallel. Tergite 8: Text-fig. 270. Sternite 8: Text-fig. 271.

Total length 7·1–10·0 mm.

♀. *Head* (Text-fig. 186). Facial index 0·56. Frons with a dull blackish transverse band, the anterior margin of which almost reaches the antennal bases. The area above this band greyish brown tomentose. Rest of head whitish grey tomentose. Some very short hairs on upper half of frons. Rest of head as in male, including antennae.

Thorax. Chaetotaxy, colour and pile as in male, but mesonotum with a much broader brownish stripe along mid-line whose width equals 0·30–0·50 mm. Scutellum also brownish along mid-line. Otherwise as in male.

Wings and *legs* as described for male.

Abdomen. Tergites 2–3 shiny black with postero-lateral corners whitish grey tomentose. Tergite 4 black and tomentose laterally. Tergites 5–7 whitish grey tomentose and more or less blackish medially. Pile blackish on the black areas of tergites 1–4 and on the whole of tergites 5–7, whitish on the pale areas of tergites 1–4. Sternites 1–4 predominantly greyish, but often more or less brownish on middle. Sternites 5–7 dark brownish. Pile whitish on sternites 1–3, blackish on sternites 4–7. Ovipositor with 2 × 6 slender, pointed, black terminal spines.

Total length 8·4–10·4 mm.

REMARKS. Kröber described both sexes of this species from material from Tamatave in Madagascar. He stated that the types were in his own collection, but as this was destroyed in Hamburg during the last war, the types it contained should be regarded as lost. In the U.S. National Museum there is a male that apparently belongs to the syntypic series. It is labelled 'Type', 'Madagascar, Tamatave', 'Type No. 24207, U.S.N.M.', and 'Psilocephala velutina Kröb., Kröber det. 1912'. It has lost both third antennal segments and parts of the legs, and is somewhat rubbed. This specimen is hereby designated as lectotype of *Psilocephala velutina* Kröber and it has been labelled accordingly.

The numerous captures by Dr Fred Keiser indicate that the species must be abundant. It is certainly a coastal species, and has been collected in the months of February, April, August, October and November. It is closely related to the two following species, *flavicornis* and *oldroydi*, which are also endemic to Madagascar, and the three species undoubtedly form a monophyletic group.

DISTRIBUTION. Probably endemic to Madagascar and apparently widespread along the east coast.

MATERIAL EXAMINED.

Lectotype ♂, MADAGASCAR: Tamatave (USNM).

MADAGASCAR: Tam., Tamatave, 6 ♂, 2 ♀, 8–31.x.1957 (*F. Keiser*) (NMB); same locality, 13 ♂, 12 ♀, 23.x–3.xi.1958 (*F. Keiser*) (NMB); same locality, 1 ♂, iv. 1926 (*R. Decary*) (MP); same locality, 1 ♀ (MP); Tam., Foulpointe, 3 ♂, 1 ♀, 28.xi.1957

(*F. Keiser*) (NMB); Tam., Maroantsetra, 2 ♂, 30.iv.1958 (*F. Keiser*) (NMB); Fia., Mananjary, 14 ♂, 10 ♀, 5–21.viii.1958 (*F. Keiser*) (NMB); Tul., Fort-Dauphin, 1 ♂, 1 ♀, 15 & 24.ii.1958 (*F. Keiser*) (NMB); same locality, 1 ♂, x. 1901 (*Ch. Alluaud*) (MP); same locality, 3 ♂, 19.iv.1968 (*K. M. Guichard*) (BMNH).

Irwiniella flavicornis **sp. n.**

(Text-figs 198, 272–276)

DIAGNOSIS. ♂. Similar to *velutina*, but antennae and palpi yellowish. Humeri, postalar calli and scutellum distinctly yellowish brown translucent, i.e. not thickly covered with whitish grey tomentum as in *velutina*. Femora yellowish brown in ground-colour and only thinly tomentose. Yellowish brown ground-colour of the abdomen also distinctly visible.

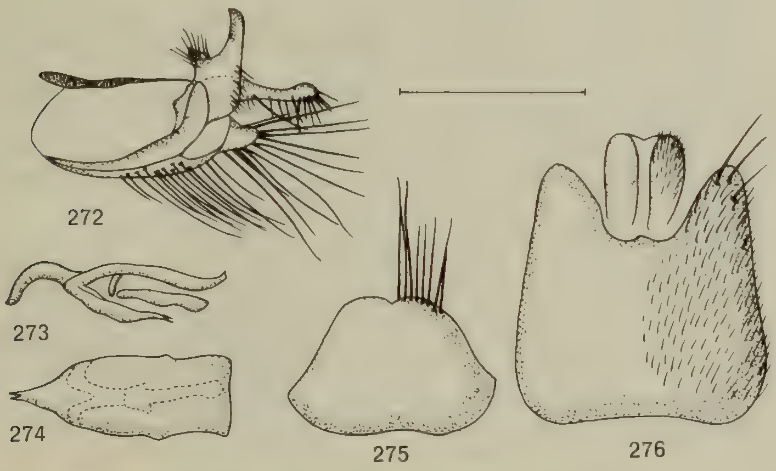
♀. Unknown.

DESCRIPTION. ♂. *Head* (Text-fig. 198). Facial index 0·50. Agreeing in most details with the head of *velutina*, but antennae and palpi yellowish. Both with very thin whitish tomentum, and antennal style black. Upper part of frons with a dull blackish area of smaller dimensions. Proboscis apparently more slender and also paler than in *velutina*. The tomentum more yellowish tinged on frons and face, and generally less dense than in *velutina*. Third antennal segment (Text-fig. 198) shorter than in *velutina*.

Thorax. Tomentum of mesonotum darker than in *velutina*, and very thin on lateral parts from humeri over notopleura to postalar calli and on to scutellum; all these areas thus appearing distinctly yellowish brown translucent. A brownish tomentose stripe along mid-line, much wider than in *velutina* and more diffusely demarcated. Pleura also less intensely tomentose. *Dc* setae absent.

Wings as in *velutina*.

Legs. Chaetotaxy as in *velutina*. Coxae and femora yellowish brown to brown in ground-colour and only slightly tomentose, thus with almost the same colour as the tibiae. F_1 darkened on anterior surface. Tibiae distinctly paler than in *velutina*, i.e. with less darkened tips.



FIGS 272–276. Male terminalia of *Irwiniella flavicornis*, holotype. 272, right gonocoxite in intero-ventral view; 273, aedeagus in lateral view; 274, aedeagus in dorsal view; 275, sternite 8; 276, epandrium in dorsal view. Scale: 0·5 mm.

Abdomen. All tergites appearing dark brown to yellowish brown, and only thinly tomentose.

Terminalia (Text-figs 272–276). Epandrium and gonocoxites brownish, the former with mainly pale hairs, the latter with entirely blackish pile. In lateral view the terminalia hardly distinguishable from those of *velutina* (Text-fig. 265). Epandrium (Text-fig. 276) distinctly different in shape from that of *velutina.* Stylus (Text-fig. 272) much wider proximally than in *velutina*, and with a pointed lobe on middle of dorsal margin. Aedeagus (Text-figs 273–274) almost as in *velutina.* Sternite 8 (Text-fig. 275) also differently shaped.

Total length 9·3 mm.

♀. Unknown.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Maj., Ambato-Boeni, 23.iv.1958 (*Fred Keiser*) (NMB). Paratype ♂, same data and depository as holotype.

***Irwiniella oldroydi* sp. n.**

(Text-figs 199, 277–281)

DIAGNOSIS. ♂. Similar to *velutina* and *flavicornis.* Antennae partly yellowish, partly blackish. Thorax thickly tomentose as in *velutina*, the tomentum more brownish grey in appearance. Femora yellowish brown, but f_1 may be darkened. Abdomen with thick tomentum covering the ground-colour as in *velutina.*

♀. Easily distinguished from the female of *velutina* by the differently coloured abdomen. The lateral tergal areas, which are whitish grey tomentose in *velutina*, are non-tomentose in *oldroydi* and appear yellowish brown.

DESCRIPTION. ♂. *Head.* Facial index 0·54. Dark coloured area on upper frons much smaller than in *velutina*; tomentum on rest of head less silvery whitish than in *velutina* and with a distinct greyish brown tinge. Only about 8 post-ocular and occipital setae on each side, all short and weak. First, second and base of third antennal segments yellowish brown, thinly whitish tomentose and with short black pile. Rest of third segment and style blackish brown. Palpi darkened at base, yellowish brown at tip.

Thorax tomentose all over, i.e. the ground-colour not visible anywhere as in *flavicornis.* Tomentum darker greyish than in *velutina*; a pale greyish brown median band with a darker brownish stripe along the mid-line is present.

Wings more intensely brownish grey tinged than in *velutina*, especially along the veins. Knob of halteres yellowish, but brownish around base.

Legs. Chaetotaxy as in *velutina.* F_1 brownish black and thinly tomentose in the holotype, but paler brownish in ground-colour on ventral surface. F_2, f_3 and all tibiae yellowish brown to brownish, darkened at tips. The paratypes also with f_1 yellowish brown.

Abdomen intensely whitish grey tomentose and with entirely whitish pile.

Terminalia (Text-figs 277–281). Epandrium mainly whitish grey tomentose, but with a broad yellowish brown rim on postero-lateral corners. Gonocoxites blackish grey. Pile on epandrium short and whitish, on gonocoxites long and blackish. Terminalia in lateral view almost as in *velutina* (Text-fig. 265). Epandrium (Text-fig. 277) very large, the posterior corners sharply pointed and broadly lamellate. Cerci comparatively weakly sclerotized and only reaching to level of apex of posterior corners of epandrium. Stylus (Text-fig. 278) with a long narrow apical part and a moderately pointed lobe in middle. Aedeagus (Text-fig. 281) shorter and wider than in *velutina.* Sternite 8: Text-fig. 279.

Total length 8·8–10·0 mm.

♀. *Head* (Text-fig. 199). The single specimen available is discoloured. Frons broader than in *velutina* (Text-fig. 186), and the blackish spot on middle lower, broader, and more widely separated from antennal bases. Other parts of the head intensely tomentose. Colour of tomentum difficult to describe, but certainly as in male. Antennae coloured as in male. Style subapical in position on the outer surface, as the inner apex of third segment has a large extension (Text-fig. 199).

Thorax. Ground-colour of scutellum yellowish brown and only slightly tomentose. Rest of thorax discoloured.

Wings. Coloured as in the male.

Legs. As in the male. All femora yellowish brown, only the knees narrowly blackish.

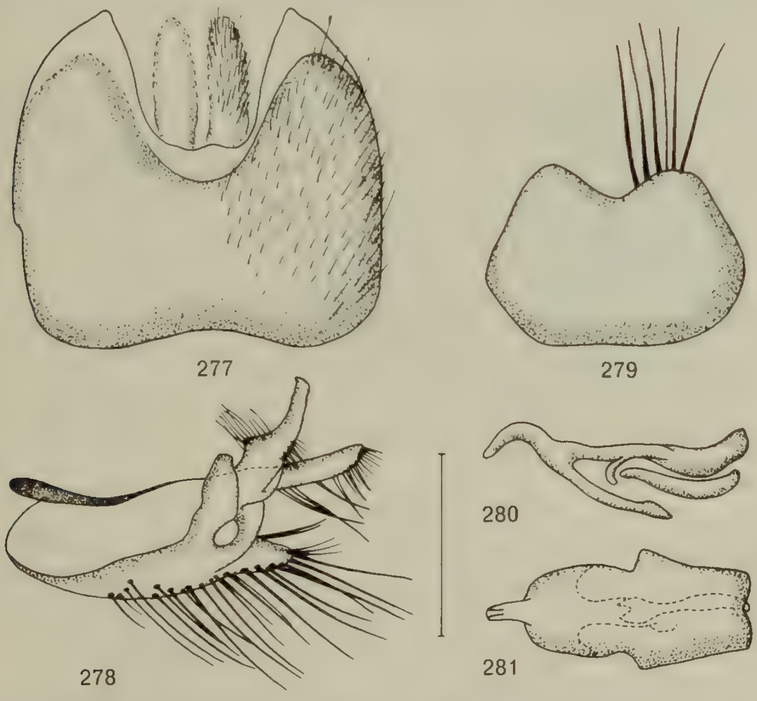
Abdomen. Ground pattern as in *velutina*, but tergite 4 also with pale postero-lateral corners, and the pale lateral areas on all tergites (2–7) yellowish brown and not distinctly tomentose. The dark areas brownish black and subshining. Sternites also extensively yellowish brown laterally and posteriorly.

Total length 11·7 mm.

MATERIAL EXAMINED.

Holotype ♂, MADAGASCAR: Isalo km P.713, 1000 m, 19.iii.1968 (*K. M. G. & P. D.*) (BMNH).

Paratypes. MADAGASCAR: same data as holotype, 1 ♀ (BMNH); Ampanihy, 250 m, 1 ♂, 16–18.ii.1958 (*B. Stuckenberg*) (NM); Sept-Lacs, 100 m, dct. Tuléar, 1 ♂, 13–16.ii.1958 (*B. Stuckenberg*) (ZMC).



FIGS 277–281. Male terminalia of *Irwiniella oldroydi*, holotype. 277, epandrium in dorsal view; 278, right gonocoxite in intero-ventral view; 279, sternite 8; 280, aedeagus in lateral view; 281, aedeagus in dorsal view. Scale: 0·5 mm.

Irwiniella maritima (Bezzi) **comb. n.**

(Text-figs 200, 282–290)

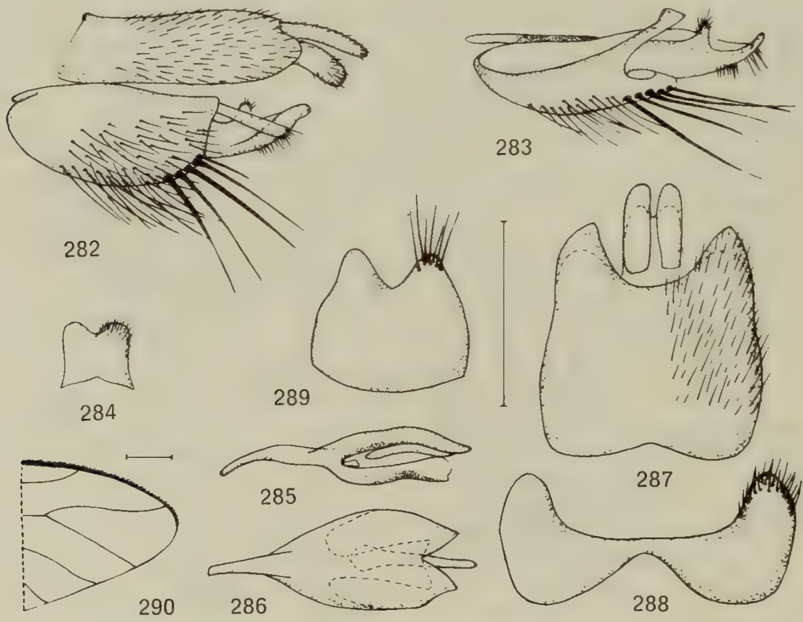
Psilocephala maritima Bezzi, *in* Bezzi & Lamb, 1926 : 544. LECTOTYPE ♂, Rodrigues I. (BMNH), here designated [examined].

Diagnosis. ♂. Frons with hairs. First antennal segment with comparatively long pile (Text-fig. 200) and slightly thickened. Genae with whitish hairs. About 2 × 25 setae on occiput. Mesonotum with broad, brown bands; *dc* setae present. Femora unicolourous. All tergites with whitish grey tomentum and whitish pile.

♀. Anterior margin of dark frontal area broadly separated from antennal bases. Third antennal segment short. Tergites 4–6 largely greyish with dark triangles on anterior parts.

Redescription. ♂. *Head* (Text-fig. 200). Facial index 0·75. Eyes practically touching for rather a short distance. Proboscis reaching a little beyond level of antennal bases. Palpi rather shorter than proboscis, greyish, with pale hairs. Upper part of frons dull blackish brown, rest of frons and other parts of head whitish grey to greyish tomentose. Frons with a few rather long, black hairs. Face bare. Genae and occiput with long whitish pile. Numerous strong black post-ocular and occipital setae on each side of occiput. Antennae with first, second and base of third segments greyish tomentose, rest of third segment blackish. Third segment rather brownish at base. First segment thickened and with a dense cover of long black setae and hairs. Apical section of style 3 times as long as basal section.

Thorax. Mesonotum with three broad brownish bands, separated by two narrow pale greyish stripes. Anterior, posterior and lateral parts of mesonotum also pale greyish. Pile on mesonotum long, blackish and erect. Scutellum grey with pale pile along posterior margin. Pleura greyish with long pale pile. 2 pairs of *dc* setae.



Figs 282–290. Male terminalia and wing-tip (290) of *Irwiniella maritima*, lectotype. 282, genitalia in lateral view; 283, right gonocoxite in intero-ventral view; 284, paraproct; 285, aedeagus in lateral view; 286, aedeagus in dorsal view; 287, epandrium in dorsal view; 288, tergite 8; 289, sternite 8; 290, wing-tip. Scale: 0·5 mm.

Wings (Text-fig. 290). Cell M_3 open. Vein R_4 very narrowly S-curved. Colour hyaline with a greyish brown tinge. Stigma very distinct and brownish. Veins dark brownish, indistinctly clouded around the cross-veins. Knob of halteres dark brownish.

Legs. F_1 with 1 *av* seta. F_2 without setae. F_3 with a row of *av* setae. T_1 with 2–3 *ad*, *pd* and *pv* setae. T_2 and t_3 with the normal four rows of setae, the *ad* setae on t_2 being very strong, the *pv* setae on t_3 short and few. Coxae greyish tomentose. Femora blackish, only thinly tomentose, posterior surfaces of f_1 and f_2 with long blackish hairs, and all femora with pale scaly hairs. Tibiae and metatarsi yellowish brown with dark brownish tips. Other tarsal segments blackish brown. Claws and pulvilli normal.

Abdomen. All tergites entirely whitish grey tomentose and with whitish pile. Whitish hind-marginal seams distinct on most segments. Sternites 1–4 whitish grey tomentose, sternites 5–7 more dark greyish. All sternites with whitish pile.

Terminalia (Text-figs 282–289). Epandrium and gonocoxites greyish tomentose and with pale pile, with some long blackish setae on posterior ventral margin of gonocoxites. Epandrium as in Text-fig. 287. Paraproct as in Text-fig. 284, i.e. not connected with any sclerotized area of the intersegmental membrane. Gonocoxite in lateral view (Text-fig. 282) remarkably short and truncate posteriorly, the stylus almost apical in position. In ventral view (Text-fig. 283) the stylus with a high narrow lobe on middle of dorsal margin, the tip itself narrow. Ventral lobe long and narrow. Hypandrium short and broad. Phallus (Text-fig. 285) long and only slightly downcurved, in dorsal view (Text-fig. 286) narrowing slightly towards apex. Dorsal apodeme (Text-fig. 285) slightly curved, in dorsal view (Text-fig. 286) oval, the distal margin with a V-shaped incision. Tergite 8: Text-fig. 288. Sternite 8 (Text-fig. 289) with a remarkable deep incision.

Total length 7·8 mm.

♀. *Head.* Upper two-thirds of frons mat brownish and with rather a dense pile of blackish hairs. Lower third of frons yellowish grey and with a few blackish hairs. Other characters as in male.

Thorax. Mesonotum with the same three broad brown bands as in male, but the stripes separating these bands and also the anterior, posterior and lateral parts of mesonotum yellowish grey to brownish grey, not pale greyish as in male. Pile consisting of short black erect hairs and longer, pale adpressed hairs. Scutellum, pleura and chaetotaxy as in male.

Wings. As in male, including the very narrow curvature of vein R_4.

Legs. Chaetotaxy and colour as in male, with the following exceptions: femora more greyish tomentose, and f_1 and f_2 with shorter and paler pile on posterior surfaces.

Abdomen. Tergite 1 mainly pale greyish. Tergites 2–4 with large blackish brown bands on anterior parts, which occupy at least two-thirds of tergal length along the mid-line and narrow towards the lateral margin; posterior parts pale greyish. Tergites 5–7 pale greyish with more or less distinct, dark, triangular anterior spots along mid-line. Pile pale and adpressed on dark bands of tergites 2–4, black and erect on lateral parts of tergites 3 and on entire surface of tergites 4–7. Sternites greyish with erect pile which is pale on sternite 2 but black on the following sternites. Ovipositor with 2 × 6 terminal spines which are black and blunt-tipped.

Total length 7·8–8·0 mm.

REMARKS. Bezzi described *Psilocephala maritima* from 9 male and 5 female specimens from Rodrigues I. I have been able to locate 8 male and 5 female syntypes. Three males and 3 females are in the BMNH, whilst 5 males and 2 females are in the Cambridge Museum. All 13 specimens are labelled 'Rodrigues I., VIII–IX 1918. H. P. Thomasset and H. J. Snell'. The BMNH specimens are further labelled 'Rodrigues I., Pres. by Dr H. Scott, B.M. 1926–190'. These 13 syntypic specimens include 2 species, clearly distinguishable by both external and genitalic characters. One of the male syntypes in the BMNH is labelled as type by Bezzi and belongs to the species which agrees best with the original description. This male is hereby designated as lectotype of *Psilocephala maritima* and has been labelled accordingly. All the other males belong to the other species, which is described below as *Irwiniella bezzii*. The 5 female specimens all belong to *maritima*. See also discussion on p. 253.

MATERIAL EXAMINED.

Lectotype ♂, RODRIGUEZ I.: viii–ix. 1918 (*H. P. Thomasset & H. J. Snell*) (BMNH). Paralectotypes, 5 ♀, same data as lectotype (BMNH & CM).

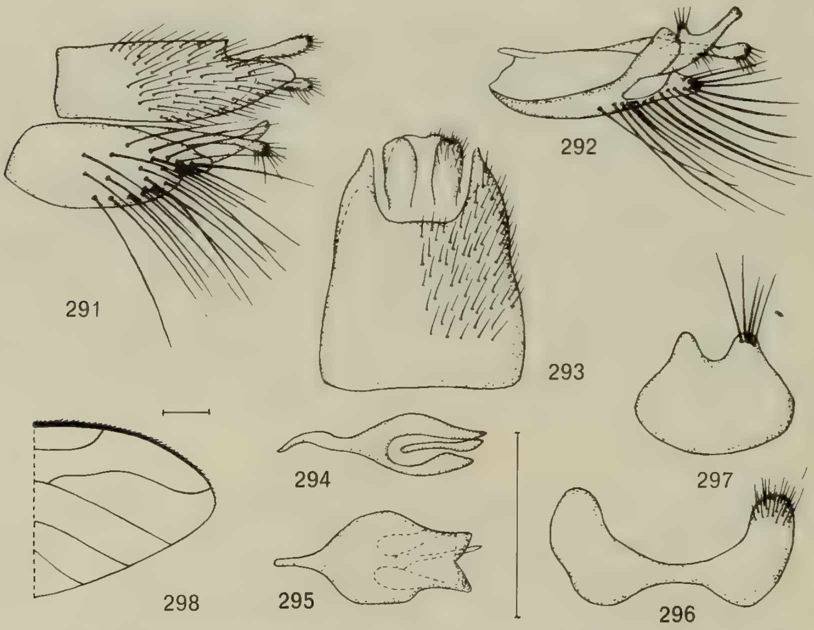
***Irwiniella bezzii* sp. n.**

(Text-figs 201, 291–298)

DIAGNOSIS. ♂. Frons with hairs. First antennal segment with comparatively long pile (Text-fig. 201), not thickened. Genae with blackish hairs. About 2 × 25 setae on occiput. Mesonotum greyish with an indistinct, narrow brown stripe along the mid-line; *dc* setae present. Femora unicolourous. All tergites with whitish grey tomentum and whitish pile.

♀. Unknown.

DESCRIPTION. ♂. Head (Text-fig. 201). Facial index 0·60. Eyes practically touching on frons, as in *maritima*, but less widely separated on lower part of head; compare facial indices. Genae also narrower than in *maritima*, i.e. virtually invisible in lateral view. Frons with more



FIGS 291–298. Male terminalia and wing-tip (298) of *Irwiniella bezzii*, holotype. 291, genitalia in lateral view; 292, right gonocoxite in intero-ventral view; 293, epandrium in dorsal view; 294, aedeagus in lateral view; 295, aedeagus in dorsal view; 296, tergite 8; 297, sternite 8; 298, wing-tip. Scale: 0·5 mm.

black hairs than in *maritima* and not distinctly brownish black above, this frontal pile not reaching beyond level of antennal bases. Palpi with black hairs basally, and genae with a group of black hairs. Antennae narrower than in *maritima*, and pile of first segment shorter, though still long if compared with the other species. Apical section of style 2·5 times as long as basal section.

Thorax. Mesonotum with three broad dark greyish bands separated by two narrow pale greyish stripes. Anterior, posterior and lateral parts of mesonotum also pale greyish. The median band with a more or less distinct, narrow brownish stripe along the mid-line, and the lateral bands may also have a brownish tinge, especially behind the suture. Mesonotal pile blackish and consisting of both erect and adpressed hairs. Scutellum, pleura and chaetotaxy as in *maritima*.

Wings (Text-fig. 298). Vein R_4 with rather different curvature than in *maritima* (cf. Text-figs 290, 298). Other characters as in *maritima*, but the colour more intensely greyish brown and veins also darker.

Legs. As in *maritima*, with the following exceptions: F_1 without *av* setae, femora more greyish tomentose, and blackish pile on f_1 and f_2 shorter.

Abdomen. Colour and pile as in *maritima*, but sternites 5–7 with more blackish hairs.

Terminalia (Text-figs 291–297). Epandrium and gonocoxites greyish tomentose as in *maritima*. Epandrium with whitish pile, but gonocoxites with very long blackish pile. Epandrium as in Text-fig. 293, its posterior corners distinctly longer than in *maritima*. Gonocoxite in lateral view (Text-fig. 291) with a short finger-like projection posteriorly. Stylus (Text-fig. 292) narrower proximally than in *maritima*, and with a less pointed tip. Ventral lobe shorter and broader. Phallus (Text-fig. 294) shorter than in *maritima*, in dorsal view (Text-fig. 295) broader proximally, and dorsal apodeme shorter than in *maritima*. Tergite 8: Text-fig. 296. Sternite 8 (Text-fig. 297) with the same deep incision as in *maritima*, but differently shaped.

Total length 6·4–8·1 mm.

♀. Unknown.

REMARKS. See discussion on p. 253.

MATERIAL EXAMINED.

Holotype ♂, RODRIGUES I.: viii–ix. 1918 (*H. P. Thomasset & H. J. Snell*) (BMNH). Paratypes. 5 ♂, same data as holotype (BMNH, CM and ZMC). The six specimens formed part of the syntypic series of *Psilocephala maritima* Bezzi (see p. 283).

Irwiniella semiargentea (Kröber) **comb. n.**

(Text-figs 202, 299–305)

Psilocephala semiargentea Kröber, 1913 : 263; Frey, 1958 : 7. Holotype ♂, CAPE VERDE IS. (MG) [not examined].

DIAGNOSIS. ♂. Frons with hairs extending below level of antennal bases. First antennal segment (Text-fig. 202) with long pile. Genae with black hairs. About 2 × 28 setae on occiput. Mesonotum indistinctly brownish and with brownish grey stripes; *dc* setae present. Femora unicolourous. All tergites with silvery whitish tomentum and pile.

♀. Frons nearly unicolourous, brownish tomentose all over, i.e. without a distinct dark area as in Text-fig. 184.

REDESCRIPTION. ♂. *Head* (Text-fig. 202). Facial index 0·63. Eyes practically touching for a short distance. Proboscis reaching to or a little beyond antennal bases. Palpi a little shorter than proboscis, greyish black with black hairs. Frons blackish at extreme top and on a narrow stripe along eye-margin in upper part; rest brownish grey tomentose. Two lateral groups of comparatively long, blackish hairs which extend a little beyond level of antennal bases. Face, genae and occiput whitish grey to ashy grey tomentose. Face bare, genae with stiff blackish pile. Lower occiput with soft and long whitish pile; upper occiput with numerous post-ocular and occipital setae, about 28 on each side. Antennae with first and third segments comparatively long. Colour blackish, first and second segments greyish tomentose, and first segment with long black pile. Apical section of style about 4 times as long as basal section.

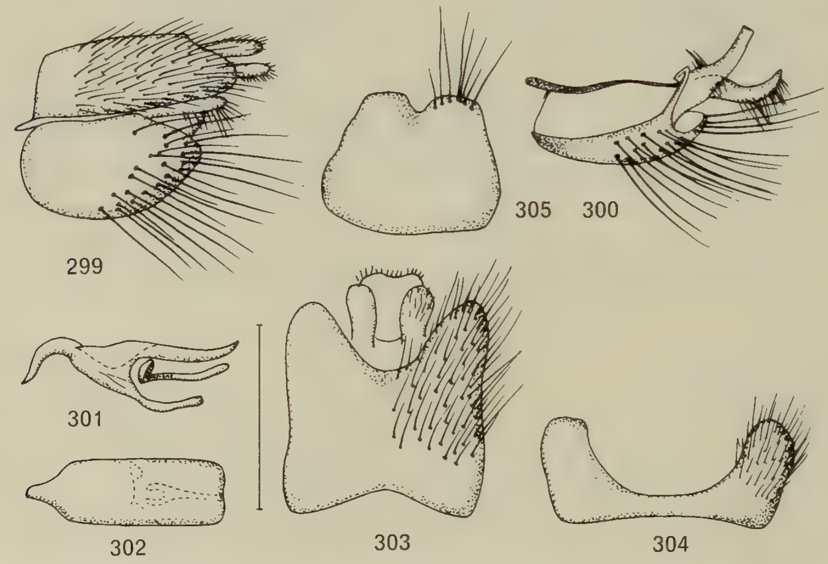
Thorax. Mesonotum brownish and with brownish grey stripes, but the stripes are not conspicuous. Seen from in front, two narrow (about 0·15 mm) brownish stripes visible, separated by a more brownish grey stripe (width about 0·10 mm) along the mid-line, and flanked by greyish brown stripes. More laterally with additional brownish stripes. Mesonotal pile apparently long (about 0·25 mm), erect and black, but also including adpressed, pale hairs. Scutellum more greyish. Pleura with greyish to greyish brown tomentum and whitish pile. 1–2 pairs of *dc* setae.

Wings. Cell M_3 rather widely open. Vein R_4 with proximal part very straight; apical part only slightly curved. Colour brownish hyaline, slightly more intensely along cross-veins. Stigma pale brownish, distinctly paler than the blackish brown veins. Halteres yellowish brown.

Legs. F_1 with 1 *av* seta near middle. F_2 without *av* setae, but with 2 short *pv* setae at base of apical third. F_3 with 4–5 rather long *av* setae, and some short *pv* setae near tip. T_1 with 2–4 *ad*, *pd* and *pv* setae, most of which are longer than width of t_1. T_2 and t_3 with the normal four rows, but *pv* on t_3 few and short. Coxae brownish grey tomentose like the pleura. Femora blackish and thinly greyish tomentose, pile on posterior parts of f_1 and f_2 long and consisting of blackish and whitish hairs. Tibiae and tarsi yellowish brown, becoming darker towards tips. Claws and pulvilli small.

Abdomen. All tergites silvery whitish tomentose, with whitish pile, and with distinct whitish hind-marginal seams. Tergites 2–4 sometimes narrowly brownish on anterior part near lateral margin. Sternites 1–3 greyish, sternites 4–7 more brownish, with yellowish white pile.

Terminalia (Text-figs 299–305). Epandrium and gonocoxites mainly greyish tomentose and



Figs 299–305. Male terminalia of *Irwiniella semiargentea*. 299, genitalia in lateral view; 300, right gonocoxite in intero-ventral view; 301, aedeagus in lateral view; 302, aedeagus in dorsal view; 303, epandrium in dorsal view; 304, tergite 8; 305, sternite 8. Scale: 0·5 mm.

with blackish pile. Epandrium as in Text-fig. 303. Distal end of dorsal gonocoxal process comparatively short. Stylus and ventral lobe (Text-fig. 300) short and narrow. Phallus in lateral view (Text-fig. 301) short and strongly curved; in dorsal view (Text-fig. 302) broad proximally and narrowing rapidly. Dorsal apodeme (Text-fig. 301) almost straight, rectangular in dorsal view (Text-fig. 302). Tergite 8: Text-fig. 304. Sternite 8: Text-fig. 305.

Total length 6·0–7·4 mm.

♀. The specimens at hand are all in poor condition, for which reason it is impossible to give a full description.

Head. Frons without any distinct pattern as in other species, but uniformly dark brownish tomentose. Small areas of a deeper brownish colour may occur on lateral parts. Frons with sparse black pile. Rest of head with paler greyish brown tomentum. Antennae as in male.

Thorax. As in male, but the pile on prosternum, propleura and fore coxae may be darker than in male.

Wings and *legs* as in male.

Abdomen. Tergites 2–4 apparently mainly brownish black and shining, and only narrowly greyish tomentose along posterior margin except at middle. The following tergites more greyish tomentose. Pile mainly black.

Total length 7·0–8·6 mm.

REMARKS. Kröber probably described this species from a single male specimen from 'Kap Verdische Inseln', but without specifying which particular island. The date was given as 'IX'. The type is in the Genoa Museum, but I was unable to borrow it because of the museum's regulations. Although it became clear during the work on the material collected in 1954 by Lindberg and Panelius that more than one species occurs on the Cape Verde Is., there seems little doubt that the specimens described here are conspecific with the holotype. See also discussion on p. 254.

MATERIAL EXAMINED.

CAPE VERDE IS.: São Tiago, Lagoa, 1 ♂, 15.ii.1954 (*Lindberg*) (ZMH); São Tiago, Praia, 2 ♂, 1 ♀, 5–14.ii.1954 (*Panelius*) (ZMH); Antão, supra Porto Novo, 1 ♀, 3.i.1954 (*Lindberg*) (ZMH).

***Irwiniella lindbergi* sp. n.**

(Text-figs 203, 306–312)

DIAGNOSIS. ♂. Similar to *semiargentea*, but frons bare, first and third antennal segments shorter (Text-fig. 203), and wings more whitish hyaline with dark brownish stigma and veins.

♀. Known only from teneral specimen in bad condition.

DESCRIPTION. ♂. *Head* (Text-fig. 203). Facial index 0·80. Eyes practically touching for a short distance. Proboscis broken. Palpi brownish grey with long black pile. All parts of head whitish grey tomentose, upper part of frons only indistinctly darkened. Frons and face bare. Genae with a darker appearance and with black hairs. Lower occiput as usual with long whitish pile. Post-ocular and occipital setae fewer in number than in *semiargentea*, only about 12 on each side; the upper post-oculars long. Antennae with first and third segments shorter than in *semiargentea*. Their colour blackish, with slight greyish tomentum. First segment with long black pile, but not as long as in *semiargentea*. Apical section of style about 3 times as long as basal section.

Thorax. Mesonotum discoloured but certainly almost as in *semiargentea*, though perhaps more pale brownish grey striped. Pile shorter than in this species and consisting of both black and whitish hairs. Pleura and coxae pale greyish tomentose and with whitish pile. 1 pair of *dc* setae.

Wings. Cell M_3 closed. Vein R_4 forming a very narrow S in shape. Colour whitish hyaline with strong brownish veins and a blackish brown stigma. Halteres blackish brown.

Legs all lost.

Abdomen. Silvery whitish tomentose as in *semiargentea*, and with whitish pile.

Terminalia (Text-figs 306–312). Epandrium and gonocoxites with greyish tomentum, pile consisting of both pale and blackish hairs. Epandrium (Text-fig. 307) shorter than in *semiargentea*, and phallus (Text-fig. 310) tapering more gradually. Sternite 8 (Text-fig. 311) without an incision on posterior margin as in *semiargentea*.

Total length 5·8 mm.

♀. A single specimen with the same data as the holotype is teneral and in such bad condition that a meaningful description is impossible.

REMARKS. See discussion on p. 254.

MATERIAL EXAMINED.

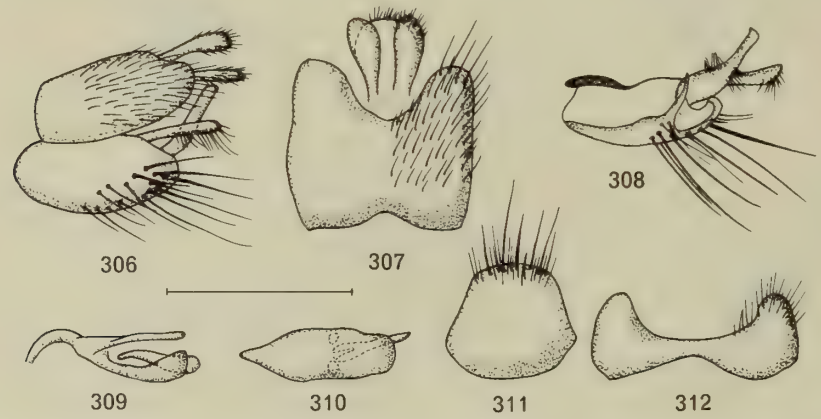
Holotype ♂, CAPE VERDE IS.: Boa Vista, Sal Rei, 29.i–1.ii.1954 (*Lindberg*) (ZMH).

Other material: 1 ♀ with same data as holotype, not a paratype (ZMH).

NEOPHYCUS Kröber

Neophycus Kröber, 1931 : 106. Type-species: *Neophycus antennatus* Kröber, 1931, by monotypy.

DESCRIPTION. *Head.* Face comparatively narrow and facial margins only slightly diverging from level of antennae down to level of bottom of eyes. Facial index about 0·47. Male eyes practically touching for a long distance and upper facets strongly enlarged. Lower frons protruding, forming an antennal socket. Genae short and narrow, forming a sharp ridge.



FIGS 306–312. Male terminalia of *Irwiniella lindbergi*, holotype. 306, genitalia in lateral view; 307, epandrium in dorsal view; 308, right gonocoxite in intero-ventral view; 309, aedeagus in lateral view; 310, aedeagus in dorsal view; 311, sternite 8; 312, tergite 8. Scale: 0·5 mm.

Both frons and face bare. Proboscis stout, with large labella. Palpi vermiform and obviously one-segmented. Antennae very long, both first and third segments strongly elongate. Antennal pile short but dense.

Thorax. Mesonotum with 3 notopleural, 2 supraalar and 1 postalar setae; *dc* setae apparently absent. Scutellum with 4 rather short setae. Both mesonotum and scutellum comparatively long and narrow. Prosternum and sternopleuron haired on entire surface.

Wings. Long and slender, especially cell M_1 in particular appearing very long. Cell M_3 short petiolate. Vein R_4 moderately curved.

Legs long and slender. Cx_1 and cx_2 with long hairs on anterior and posterior surfaces. All femora with anteroventral setae, and tibiae with chaetotaxy as described for *Irwiniella*.

Abdomen rather slender and of nearly equal width throughout, almost entirely tomentose and short haired.

Male terminalia agreeing exactly with the description given under *Irwiniella*.

REMARKS. The genus is represented only by one species, which is known to the present author only from two specimens. *Neophycus* is clearly a derivate of the *Irwiniella*-complex of species. Apomorphic characters for the genus are the strongly elongate antennae, the long and slender wings and also the tendencies to elongation of the mesonotum, scutellum and abdomen.

Neophycus antennatus Kröber

(Text-figs 313–319)

Neophycus antennatus Kröber, 1931 : 106; Kröber, 1933 : 299. Holotype ♂, CAMEROUN (ZMB) [examined].

DIAGNOSIS. ♂. Easily distinguished from all other Ethiopian Therevinae, except for *Schoutedenomyia longeantennata*, by the very elongate antennae. Can be distinguished from *longeantennata* by the generic characters (see diagnostic key on pp. 197–198).

REDESCRIPTION. ♂. *Head.* Facial index about 0·47. The projecting lower frons with a large dull black area, greyish tomentose below. Face and occiput pale greyish tomentose. Occiput with whitish hairs, with about 10 strong post-ocular and occipital setae above. Palpi almost as long as proboscis, greyish brown, and with long whitish hairs. Antennae with first segment about 12 times as long as wide. Third segment including style about 10 times as long as wide at middle, the style itself consisting of two equal sections and a broad apical spine. Style about half as long as third segment proper. First segment blackish, but slightly brownish basally, and with moderately long, black pile. Second segment brownish. Third segment and its style pale yellowish, but third segment a little brownish basally.

Thorax. Mesonotum and scutellum blackish with thin greyish tomentum which does not form distinct pattern and with short adpressed pile. Pleura thinly greyish tomentose, with short whitish hairs.

Wings. Colour greyish hyaline; the area over discal cell brownish tinged. Veins and halteres brownish black.

Legs. F_1 and f_2 with 2–3 short *av* setae. F_3 with several short *av* setae in apical two-thirds. T_1 with rows of strong *ad*, *pd* and *pv* setae. T_2 and t_3 with the usual four rows of setae. Femora blackish with apices brownish. T_1 and t_3 as well as corresponding tarsi brownish black. T_2 and its tarsus paler brownish.

Abdomen. Tergites appearing mainly whitish grey tomentose, but tergite 4 and lateral parts of tergite 5 shining blackish. Sternites 1–3 whitish grey tomentose, following sternites more blackish. Abdominal pile short and consisting of both whitish and blackish hairs but on lateral margin of tergites 4–7 a long and tuffy pile which is black on tergites 4–5 and white on tergites 6–7.

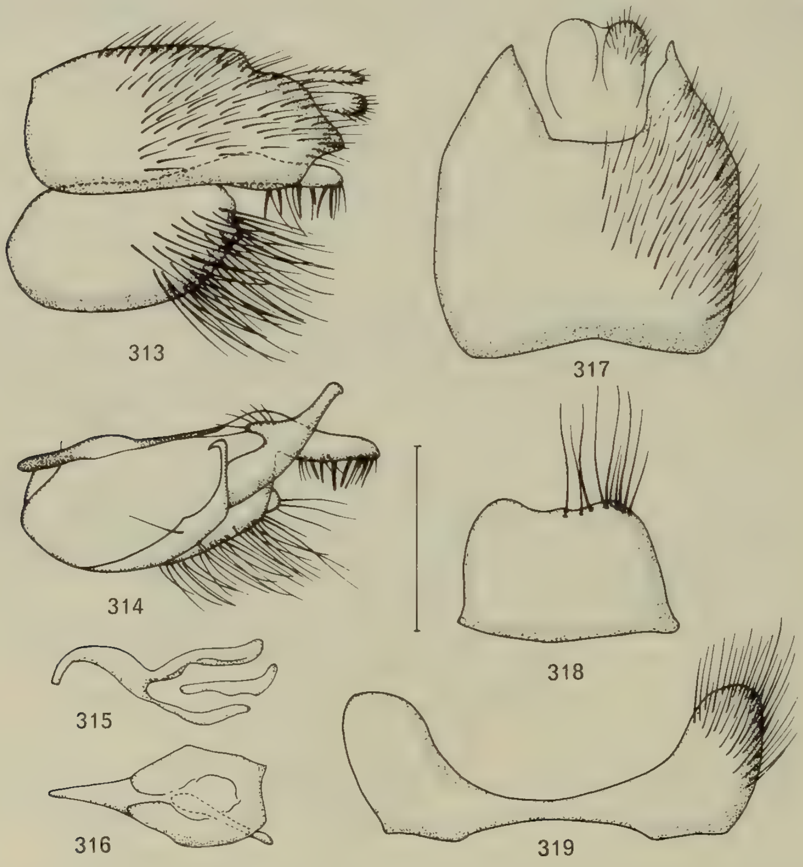
Terminalia (Text-figs 313–319). Blackish brown with blackish hairs. Epandrium (Text-fig. 317) rather bulbous and with pointed posterior corners. Paraproct weakly sclerotized and continuing into the intersegmental membrane. Gonocoxite (Text-fig. 313) with a small tubercle on posterior margin. Distal end of dorsal gonocoxal process strong, reaching to level of posterior margin of epandrium. Stylus (Text-fig. 314) long and slender, with a strong hook at middle. Ventral lobe rather long and narrow. Phallus in lateral view (Text-fig. 315) with proximal part almost straight, its apex strongly downcurved. Phallus narrow in dorsal view (Text-fig. 316). Dorsal apodeme (Text-figs 315) slightly upcurved, nearly hexagonal in dorsal view. Tergite 8: Text-fig. 319. Sternite 8: Text-fig. 318.

Total length 10·6 mm.

♀. Unknown.

MATERIAL EXAMINED.

Holotype ♂, CAMEROUN: Uam district, near Bosum, 26.vi.1914 (*G. Tessmann*)



FIGS 313–319. Male terminalia of *Neophycus antennatus*, holotype. 313, genitalia in lateral view; 314, right gonocoxite in intero-ventral view; 315, aedeagus in lateral view; 316, aedeagus in dorsal view; 317, epandrium in dorsal view; 318, sternite 8; 319, tergite 8. Scale: 0·5 mm.

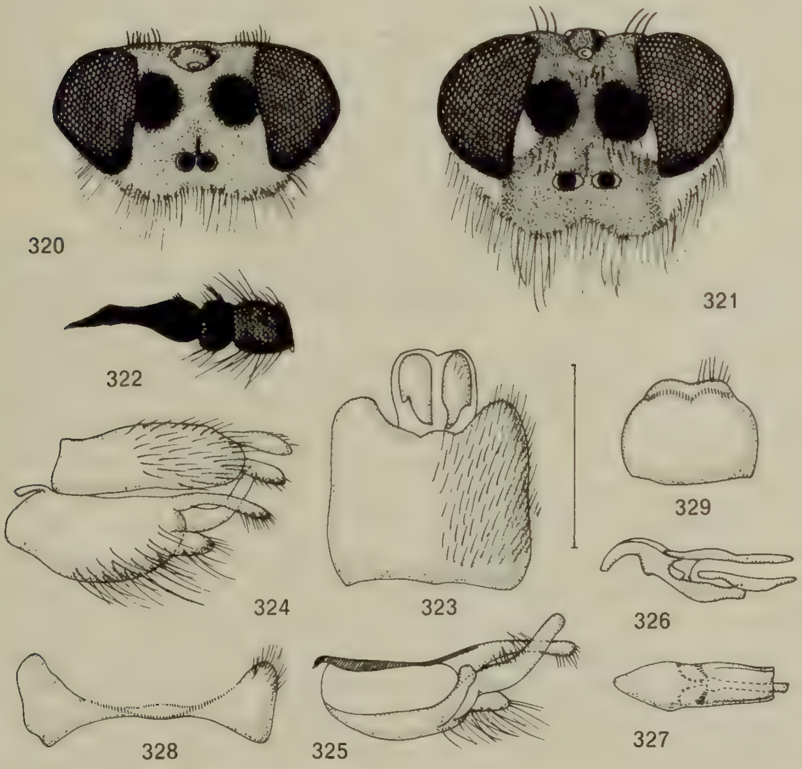
(ZMB). The holotype is not in good condition, as the head, thorax and abdomen are crushed and deformed. The specimen is also slightly mouldy.

NIGERIA: Ibadan, 1 ♂, 1.v.1929 (*F. D. Golding*) (BMNH).

NEOTHEREVA Kröber

Neothereva Kröber, 1912 : 138. Type-species: *Thereva citrina* Becker, 1902, by PRESENT DESIGNATION.

DESCRIPTION. *Head* (Text-figs 320–322). Male eyes nearly touching for a short distance or separated by as much as twice the width of anterior ocellus. Facial indices vary from 0·75 to 0·93. Female eyes widely separated on frons, which is nearly square-shaped and has two circular areas of a velvety black or dark brown tomentum. Antennae inserted near level of



FIGS 320–329. *Neothereva*. 320, head of *N. citrina*, ♀ holotype; 321, head of *N. arenaria*, ♀ paratype; 322, antenna of *N. arenaria*, ♂ holotype; 323–329, male terminalia of *N. arenaria*, ♂ holotype; 323, epandrium, 324, genitalia in lateral view; 325, right gonocoxite in intero-ventral view; 326, aedeagus in lateral view; 327, aedeagus in dorsal view; 328, tergite 8; 329, sternite 8. Scale: 0·5 mm.

bottom of eyes. Frons with a sparse pile of stiff, black hairs, especially in female. Face bare. Genae and occiput with dense pubescence of soft whitish hairs. Post-ocular setae few and short. Occipital setae absent. Proboscis short, not reaching level of antennal bases. Palpi one-segmented, vermiform, as long as proboscis. Antennae simple. Eye-facets of nearly equal size.

Thorax. Mesonotum with 3 notopleural, 1–2 supraalar and 1 postalar setae. 0–2 pairs of dorsocentral setae. Scutellum with 4 strong setae. Prosternum with hairs on whole surface. Sternopleuron without pile on posterior part.

Wings. Cell M_3 short petiolate. Cell R_5 rather wide towards apex, 1·6–2·3 times as long as wide between tips of veins R_4 and R_5.

Legs. Cx_1 shorter than usual in the subfamily, anteriorly with long pale hairs, but without real setae. Cx_1 and cx_2 posteriorily with pale hairs. F_1 and f_2 without anteroventral setae; f_3 with a few anteroventral setae. T_1 with ca 3 anterodorsal and posterodorsal setae, but usually only 1–2 posteroventral setae. T_2 with 3–4 anterodorsal and posterodorsal setae, 1–2 anteroventral and posteroventral setae. T_3 with several setae in all four positions, but posteroventral setae few and short.

Abdomen. Usually entirely tomented in male, in female with indistinct pattern. Pile exclusively whitish.

Male terminalia. These follow the ground-plan as described for *Irwiniella* (see p. 253).

REMARKS. The original diagnosis reads: 'Sehr ahnlich *Thereva*, aber dadurch unterschieden, dass beim ♂ die Augen durch die Breite der Ocellen getrennt sind. Körperbau wie bei *Thereva*, desgleichen Fühler und Flügel. Vierte Hinterrandzelle geschlossen, oft lang gestielt. Kleine Arten von 6,5 bis 9,5 mm'. It will be seen that the only diagnostic character given was the comparatively wide separation of the male eyes.

Kröber originally included in this genus five species: *N. nitidifrons* Kröber (♂, Budapest), *N. angustifrons* Kröber (♂, Egypt), *N. latifrons* (Macquart), *N. citrina* (Becker), and *N. frontata* Kröber (♂, Europe); all except *citrina* and *latifrons* were described as new.

N. nitidifrons is unknown to the present writer and the type (formerly in the Budapest Museum) is now lost. *Thereva latifrons* Macquart (1848 : 31) was described as a male, but Becker (1922 : 33) was of the opinion that Macquart's species in fact was described on the basis of a female specimen. Its inclusion in *Neothereva* cannot be accepted, as the identity of Macquart's species is completely unclear.

About the fifth included species, viz., *frontata*, it can be stated that according to the type, a male from 'Europa' in the Vienna Museum, this species is conspecific with *Thereva vulpina* Kröber (1912 : 696) which is very closely related to *Thereva bipunctata* Meigen. A more or less distinct secondary separation of the eyes occurs often in *bipunctata*, mainly in populations in coastal areas, and such forms were described as *Neothereva hermaphrodita* by Becker (1922 : 33) on the basis of material from Bornholm and from near Bordeaux. The species just mentioned are not congeneric with *citrina*, but belong in the genus *Thereva*.

Of the two remaining of the originally included species, *angustifrons* is conspecific with *citrina*. I therefore designate the fourth of the originally included species, viz. *citrina* Becker, as the type-species of *Neothereva* Kröber.

The nomenclatural changes that follow from these considerations are set out formally below.

Thereva frontata (Kröber) **comb. n.**

Neothereva frontata Kröber, 1912 : 140. Holotype ♂, 'EUROPA' (NMW) [examined].
Thereva vulpina Kröber, 1912 : 696. Lectotype ♂, AUSTRIA (NMW) [examined]. **Syn. n.**

Thereva bipunctata Meigen

Thereva bipunctata Meigen, 1820 : 121. 2 ♀ syntypes, locality and depository unknown.
Neothereva hermaphrodita Becker, 1922 : 33. Lectotype ♀, DENMARK: Bornholm (ZMB) [examined]. **Syn. n.**

Neothereva citrina (Becker)

Thereva citrina Becker, 1902 : 35. Lectotype ♂, EGYPT (ZMB) [examined].
Neothereva angustifrons Kröber, 1912 : 139. Holotype ♂, EGYPT (ZMB) [examined]. **Syn. n.**

The genus *Neothereva* is widely distributed in the Saharan area from Israel and Egypt westwards towards the Atlantic coast of Mauritania. A couple of undescribed species are at hand from the Palaearctic part of that area apart from the type-species, *citrina*, which occurs in Israel and Egypt. It is an interesting fact that the genus is also represented on the southern hemisphere, namely on the coast of South West Africa. The phylogenetic relationships of the genus seem unclear.

KEY TO ETHIOPIAN SPECIES OF *NEOTHEREVA* KRÖBER

(Male of *N. macularis* is unknown)

1 All setae of head, mesonotum and legs pale. Cell R_4 long, about 2·0–2·3 times as long as wide. First antennal segment about twice as long as wide. Male eyes certainly well-separated . . . . **macularis** (p. 294)
– All setae of head, mesonotum and legs black. Cell R_4 shorter, about 1·6 times as long as wide. First antennal segment about as long as wide (Text-fig. 322). Male eyes practically touching . . . . **arenaria** (p. 293)

***Neothereva arenaria* sp. n.**

(Text-figs 321–329)

DIAGNOSIS. ♂ ♀. All setae black. Frons with golden tomentum. Face about three-fourths as broad as height of head. Cell R_5 only about 1·6 times as long as wide at apex.

DESCRIPTION. ♂. *Head* (Text-fig. 322). Facial index ca 0·75. Eyes nearly touching for a short distance. Upper frons black. Lower frons and face with golden tomentum, becoming pure greyish on lower frons and on genae and occiput. Some hairs laterally on lower frons. Face bare. Genae and occiput with dense white pile. 1–3 short and weak post-ocular setae present. Occipital setae absent. Antennae blackish, first segment slightly tomentose; style rather long.

Thorax. Mesonotum greyish brown tomentose, with three darker brownish bands which are ill-defined and disjointed. Mesonotal pile whitish and rather long. 1–2 pairs of *dc* setae present. Only 1 *sa* seta present. Scutellum brown with whitish pile. Pleura greyish with whitish pile.

Wings. Vein R_4 nearly straight, only bent close to fork of R_{4+5} and near its tip. Ground colour whitish hyaline. Veins partly pale yellowish, partly blackish. Infuscations of dark microtrichia occur around cross-veins, around tips of cell M_3 and anal cell, tip of vein R_{2+3} and on stigma. Halteres pale yellowish.

Legs. Colour yellowish; apex of tibiae and last tarsal segments may be slightly darkened.

Abdomen. This is greyish tomentose all-over, but posterior tergites may be distinctly yellowish brown translucent. Pile dense and exclusively whitish.

Terminalia (Text-figs 323–329). Entirely yellowish brown and with whitish pile. Epandrium as in Text-fig. 323. Stylus shaped as shown in Text-fig. 325. Ventral lobe long and narrow. Posterior margin of gonocoxite (Text-fig. 324) with a well-marked projection. Distal end of dorsal gonocoxal process strongly overhangs posterior margin of epandrium. Phallic part of aedeagus (Text-fig. 326) strong and strongly curved in lateral view; in dorsal view (Text-fig. 327) slightly wider proximally than proximal part of dorsal apodeme. Tergite 8: Text-fig. 328. Sternite 8: Text-fig. 329.

Total length about 6·2–6·6 mm.

♀. *Head* (Text-fig. 321). Facial index ca 0·85. Frons and face largely golden brownish tomentose. On frons two large areas of a deep velvety black colouration, and areas below these spots silvery tomented close to eye-margin. Black spots with dense pile of short coarse hairs. Pile of genae and occiput not whitish as in male, but more yellowish brown.

Thorax, wings and *legs.* Almost as in male, but wing more distinctly spotted, and also thoracic pile darker than in male.

Abdomen. All tergites pale brownish, darker on anterior middle parts of first tergites. Posterior tergites with sparse greyish tomentum. Pile short, pale and rather sparse. 7 + 7 terminal spines on ovipositor. The spines are slightly spatulate apically.

Total length 7·0–7·5 mm.

MATERIAL EXAMINED.

Holotype ♂, SOUTH WEST AFRICA: Swakopmund, 26–30.i.1972 (BMNH).

Paratypes. SOUTH WEST AFRICA: same data as holotype, 1 ♂ (BMNH); Swakop River Mouth, 8 m, coastal and riverbed dunes, 56 ♂, 10 ♀, 9.ii.1974 (*M. E. & B. J. Irwin, L. Lyneborg*) (NM & ZMC); Lüderitz, Agate Beach, 3 m, low coastal vegetated dunes, 6 ♂, 1 ♀, 18.ii.1974 (*M. E. & B. J. Irwin, L. Lyneborg*) (NM & ZMC).

Neothereva macularis (Wiedemann) **comb. n.**

Thereva macularis Wiedemann, 1828 : 558. Holotype ♀, ?SUDAN 'Nubia' (SMF) [examined].

DIAGNOSIS. ♂. Unknown.

♀. All setae pale. Frons greyish tomentose. Face broader than in *arenaria*, and cell R_5 longer and narrower than in this species.

DESCRIPTION. ♀. *Head.* Facial index ca 0·93. Head totally greyish tomentose, on frons with two roundish velvety black areas (cf. Text-fig. 320). Frons and face practically bare. Genae and occiput with a dense whitish pile. About 5 pale post-ocular setae on each side. Occipital setae not distinct. First and second antennal segments pale greyish brown with short pale pile. Third segment lost in both specimens available.

Thorax. Mesonotum greyish with three indistinct and interrupted greyish black bands. Pile and setae all pale. Chaetotaxy cannot be stated.

Wings. Cell R_4 distinctly longer and narrower than in *arenaria*, its index about 2·0–2·3. Ground colour whitish hyaline, wing much less spotted than in *arenaria*, spots being restricted to surroundings of cross-veins and tips of veins R_{2+3} and R_4.

Legs. Chaetotaxy as described for the genus. Colour exclusively yellowish, with pale hairing and setae.

Abdomen. Brownish and without definite pattern, only with paler hind marginal seams. Abdominal pile pale.

Total length 7·6–8·5 mm.

Material examined.

Holotype ♀ of *macularis*,? Sudan, labelled as 'Abyssinia, Dr. Rüppell', type-locality stated by Wiedemann as 'Aegypten'.

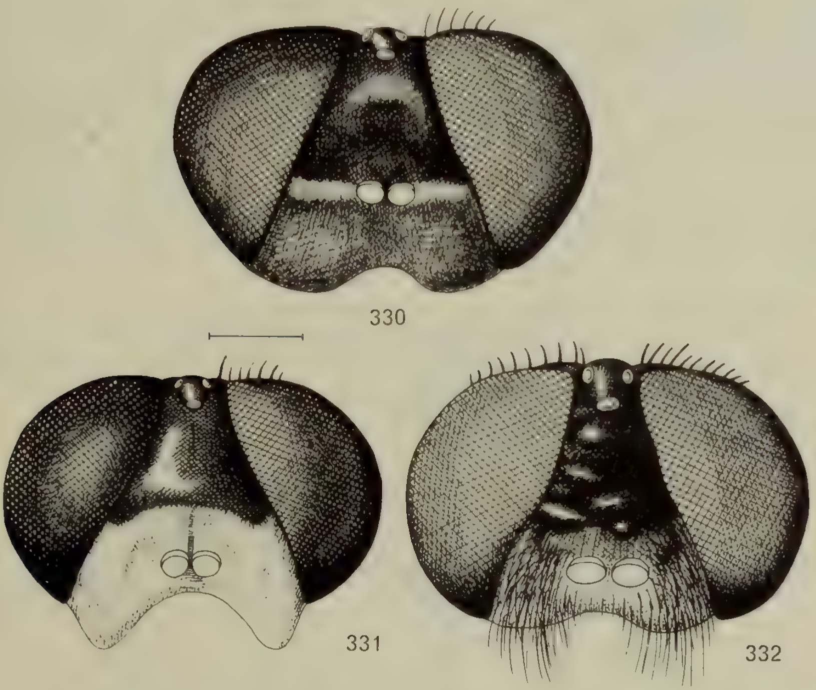
Mauritania: Nouakshott, 1 ♀, 17–21.x.1948 (*L. Berland & A. Villiers*) (IFAN).

PSEUDOTHEREVA gen. n.

Gender: feminine.

Type-species: *Thereva aethiopica* Bezzi, 1906.

Description. *Head* (Text-figs 330–332). Face moderately broadened. Facial indices varying between 0·84 and 0·98, i.e. distance across face between lower corner of eyes is 84 to 98 per cent of height of head, only overlapping with *Irwiniella* in the female of *I. natalensis* (head index 0·87), while *Thereva* has facial indices varying between 0·94 and 1·27. Male eyes touching on frons. Female frons rather broad and predominantly shining blackish, at most paler tomentose on lower part, the shining part not forming a distinct demarcated callus as in



Figs 330–332. *Pseudothereva*, female heads in frontal view. 330, *Ps. unifasciata*, holotype; 331, *Ps. aethiopica*; 332, *Ps. parviseta*. Scale: 0·5 mm.

Thereva s. str. Both frons and face with distinct pile. Genae rather broad, evenly curved and with long pile. Antennae (Text-figs 333–335) long and slender, first segment with long pile; style varying in length, but usually long. Proboscis and palpi as in *Irwiniella*.

Thorax as described for *Irwiniella*, but the female of *parviseta* with very sparse pile on sternopleuron.

Wings with cell M_3 open in *parviseta*, short-petiolate in the other species.

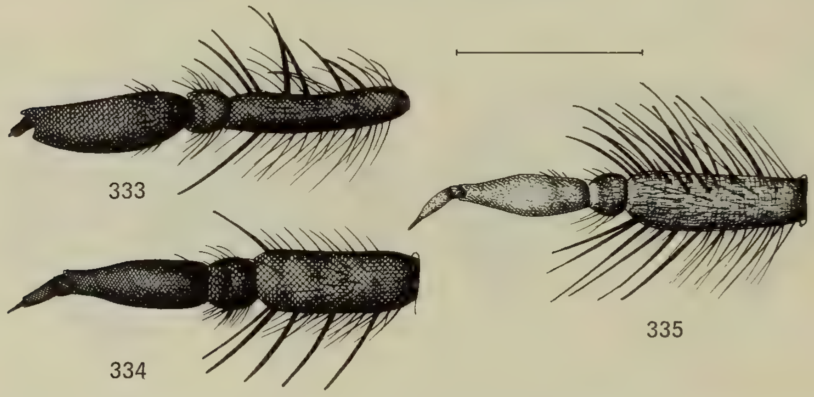
Legs. Cx_1 and cx_2 with hairs on anterior and posterior surfaces as in *Irwiniella*, and femoral and tibial chaetotaxy also as in this genus. However, in *parviseta* the *pd* setae of t_1 may be absent, a very unusual character in this part of the family.

Abdomen. Male abdomen either entirely tomentose or with distinct blackish anterior bands on first tergites. Female abdomen largely black and shining, always with small postero-lateral bands of greyish tomentum on tergite 2, sometimes also on the following tergites.

Male terminalia. Epandrium relatively broad and deeply incised on posterior margin. Paraproct in the type-species not continuing into a sclerotization of the intersegmental membrane, in *parviseta* (Text-fig. 345) fused with a distinct narrow sclerotization on this membrane. Distal end of dorsal gonocoxal process not as long and straight as in *Irwiniella*, but more down-curved from near its base, very enlarged in the type-species, much more slender in *parviseta*. Stylus large, and ventral lobe short and broad. Hypandrium relatively large. Aedeagus with a strongly curved phallus which is rather long. Dorsal apodeme very broad, with lateral out-shoots in the type-species. Ventral apodeme large and trough-shaped.

REMARKS. The genus is represented by four species in the Ethiopian region, but the male sex of only two species is known. Three of the species, viz. *aethiopica*, *kijabea* and *unifasciata*, form an obvious monophyletic group, whereas *parviseta* may later deserve to be placed in a genus of its own because it possesses special apomorphic characters, in particular the reduction of the *pd* setae of t_1. The geographical distribution also supports this separation.

The genus *Pseudothereva* is certainly a derivate, having its origin in the *Irwiniella*-complex of species. Compared with *Irwiniella* it shows further anagenetic progress in the flattening of the head, giving rise to facial indices, which have values intermediate between *Irwiniella* and *Thereva*. A further apomorphic character in comparison with *Irwiniella* is the presence of pile on the face. *Thereva* certainly represents a different line of evolution from *Pseudothereva*. This genus also has a



FIGS 333–335. *Pseudothereva*, antennae. 333, *Ps. unifasciata*, ♂ holotype; 334, *Ps. aethiopica*, ♀; 335, *Ps. parviseta*, ♂ holotype. Scale: 0·5 mm.

hairy face, but the flattening of the head has progressed further so that the facial index of *Thereva* has values near or over 1·00, i.e. the facial width between lower corners of eyes is equal to or larger than head-height.

KEY TO SPECIES OF *PSEUDOTHEREVA*

MALES

(Unknown in *kijabea* and *unifasciata*)

1 Abdomen entirely silvery greyish tomentose. Only 5–6 post-ocular setae. Cell M_3 short-petiolate. T_1 with distinct *pd* setae . . . . . **aethiopica** (p. 297)
– Abdomen with shining blackish anterior bands on tergites 2–4. Numerous post-ocular setae. Cell M_3 open. T_1 without distinct *pd* setae . **parviseta** (p. 301)

FEMALES

1 Frons (Text-fig. 330) uniformly subshining blackish all over. Antennal style (Text-fig. 333) very short. Tergites 2–4 entirely glossy black . . **unifasciata** (p. 300)
– Frons distinctly greyish tomentose on lower part. Antennal style (Text-figs 334, 335) much longer. At least tergite 3 with small tomentose areas on postero-lateral corners 2
2 Face with very long pile, the hairs comparable in length to length of first antennal segment. Tergites 4–7 entirely glossy black . . . . . **parviseta** (p. 301)
– Face with pile much shorter than length of first antennal segment. At least some of tergites 4–7 greyish tomentose laterally 3
3 Proboscis reaching to level of antennal bases. Whitish grey stripes separating dark mesonotal bands rather narrow and indistinctly demarcated. Tergite 7 with lateral areas of silvery greyish tomentum. . . . . . **aethiopica** (p. 297)
– Proboscis not reaching to level of antennal bases. Whitish grey stripes separating dark mesonotal bands broad and very distinctly demarcated. Tergite 7 entirely black . . . . **kijabea** (p. 300)

Pseudothereva aethiopica (Bezzi) **comb. n.**

(Text-figs 331, 334, 336–342)

Thereva aethiopica Bezzi, 1906 : 264; Kröber, 1912 : 405; Kröber, 1925 : 11; Kröber, 1931 : 133. LECTOTYPE ♂, ETHIOPIA (MCM), here designated [examined].
Psilocephala aethiopica (Bezzi) Kröber, 1912 : 136; Kröber, 1925 : 29; Kröber, 1931 : 127.

DIAGNOSIS. ♂. Genae with whitish hairs. 5–6 post-ocular setae. Mesonotum with three brownish black bands separated by distinct pale greyish stripes. Abdomen silvery whitish tomentose.

♀. Short black hairs on face. Upper two-thirds or more of frons black and distinctly shining, lower third tomentose. Abdomen glossy black with sharply limited silvery greyish tomentose areas on postero-lateral corners of tergites 2–7.

REDESCRIPTION. ♂. *Head*. Facial index not known. Eyes touching. Proboscis reaching well beyond level of antennal bases. Palpi shorter than proboscis, blackish, with whitish hairs. Head discoloured in the only specimen available, but certainly entirely covered with whitish grey tomentum. Frons and face covered with long, blackish hairs. Genae and occiput with long whitish pile. Only 5–6 post-ocular setae on each side, and a similar number of occipital setae. First and second antennal segments blackish, with long blackish pile; third segment lost.

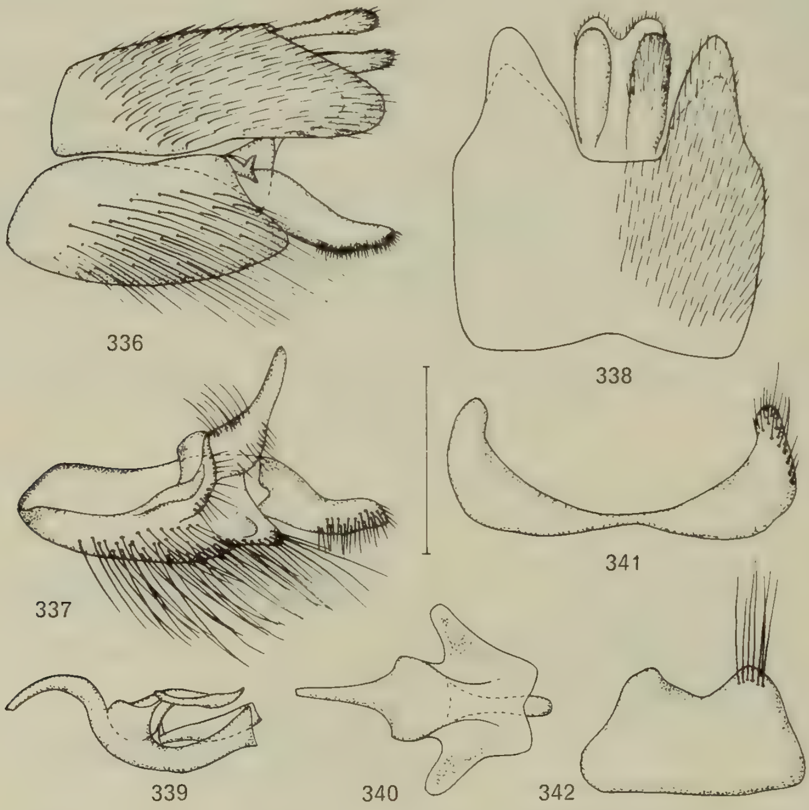
Thorax. The mesonotal pattern is difficult to describe due to discoloration, but apparently there are three brownish black bands, separated by paler stripes. Mesonotal pile consisting of long blackish hairs (length about 0·10 mm) and shorter pale hairs. Scutellum mainly tomentose, with long pale hairs. Pleura greyish tomentose with pale hairs. Only 1 *sa* setae on each side. *Dc* setae absent.

Wings. Cell M_3 short-petiolate. Vein R_4 strongly S-curved, and cell R_4 thus very wide. Colour greyish brown. Stigma pale brownish and veins dark brownish. Halteres with blackish knob.

Legs. F_1 and f_2 with 1 long *av* seta. F_3 with a row of long *av* setae and with much shorter, spiny *pv* setae. T_1 with some *ad*, *pd* and *pv* setae, the a*d* and *pd* restricted to basal half. T_2 and t_3 with the usual four rows of setae. Coxae greyish. Femora blackish with greyish tomentum, especially on the ventral surfaces. Femoral pile pale and long. Tibiae yellowish brown, darkened at tips, especially on t_1. Tarsi blackish brown.

Abdomen. Tergites silvery greyish tomentose, tergite 1 and anterior part of tergite 2 less distinctly so. Hind-marginal seams whitish yellow and distinct on the first six tergites. Sternites greyish black, darkest in the middle, distinctly tomentose laterally. Pile long and whitish.

Terminalia (Text-figs 336–342). Epandrium greyish tomentose, but yellowish brown



FIGS 336–342. Male terminalia of *Pseudothereva aethiopica*, lectotype. 336, genitalia in lateral view; 337, right gonocoxite in intero-ventral view; 338, epandrium in dorsal view; 339, aedeagus in lateral view; 340, aedeagus in dorsal view; 341, tergite 8; 342, sternite 8. Scale: 0·5 mm.

posteriorly, with short hairs only. Gonocoxites greyish black and mainly with long blackish hairs. Epandrium as in Text-fig. 338. Distal end of dorsal gonocoxal process very long and broad (Text-fig. 336), down-curved and with tip reaching beyond level of epandrium; bearing a dentate projection proximally. Stylus (Text-fig. 337) very long, apical part straight and narrow. Ventral lobe small, curved and with hairs which is an unusual feature. Phallic part of aedeagus (Text-fig. 339) strongly upcurved, then gradually down-curved; in dorsal view (Text-fig. 340) abruptly narrowing proximally. Dorsal apodeme flat and with two lateral off-shoots. Tergite 8: Text-fig. 341. Sternite 8: Text-fig. 342.

Total length 9·0 mm.

♀. *Head* (Text-figs 331, 334). Facial index 0·84. Most of frons black, with a brownish tinge laterally, shining but not glossy. On middle the frons gradually becomes more dulled by tomentum below, while the lateral areas of lower frons are whitish grey tomentose as are the face, genae and occiput; the latter subshining on upper part. Upper part of frons with short black hairs, middle part bare, and lower part with lateral groups of short black hairs which continue downwards on face to level of bottom of eye. Remainder as in male. Antennae entirely black.

Thorax. Mesonotal pattern consisting of three broad blackish brown bands separated by very distinct whitish grey stripes. Lateral areas of mesonotum also pale greyish. Remainder as in male, but mesopleuron subshining. One pair of *dc* setae present.

Wings. Cell M_3 closed at wing-margin in one specimen, narrowly open in the other specimen. Vein R_4 and cell R_4 as in male. Colour greyish brown as in male, but with distinct darker brownish shadows along the longitudinal veins. Veins and halteres blackish brown.

Legs. F_1 with 1 strong *av* seta. F_2 with 2 strong *av* setae. Remainder as in male.

Abdomen. Tergites mainly deep black and glossy. Posterior margins of tergites 2–3 with sharply marked bands of silvery greyish tomentum. Laterally these tomentose bands occupy about one-third of total tergal length; they decrease gradually in width towards the mid-line where they occupy about one-third of tergal length. Tergite 4 with a small area of similar tomentum on postero-lateral corners. Lateral parts of tergites 5–7 with larger areas of silvery greyish tomentum, these tomentose bands diverging from tergal hind-margins. Pile short and sparse, pale on most of tergites 1–3, black on the rest. Sternites blackish, and posterior corners of sternites 2–4 tomentose. Pile as on tergites. Terminal spines broad and blunt-tipped.

Total length 9·5–10·2 mm.

REMARKS. Bezzi described both sexes of this species from material from 'Dintorno di Adi Caiè' in the Eritrea Province of Ethiopia. Only one male specimen is present in his collection in the Milan Museum. It is labelled '289', 'Adi Caiè, viii. 1902 Eritrea', and 'Thereva aethiopica, type, Bezzi'. The specimen agrees well with Bezzi's description and is hereby designated lectotype. It has lost both third antennal segments, right p_2, and left p_3, and some tarsal segments from the remaining legs are also missing. The author has not been able to locate female specimens identified by Bezzi as *aethiopica*.

Kröber (1912), probably without having seen Bezzi's material, recorded the male as *Thereva aethiopica* Bezzi and the female as *Psilocephala aethiopica* Bezzi, apparently because he took the two sexes of Bezzi's species as representing two generically distinct species. Apart from the fact that the same name cannot be used in two different combinations, he was also apparently wrong in not accepting the male and female described by Bezzi as conspecific.

DISTRIBUTION. So far known only from a small area near Asmara in the mountains of northern Ethiopia.

MATERIAL EXAMINED.

Lectotype ♂, ETHIOPIA: Eritrea, Adi Caiè, viii. 1902 (*Andreini*) (MCM).

ETHIOPIA: Eritrea, Asmara, 1 ♀, 29.ix.1960 (*D. J. Greathead*) (DJG); Eritrea, Hamasien, 1 ♀, 15.x.1957 (*D. J. Greathead*) (DJG).

Pseudothereva kijabea (Séguy) **comb. n.**

Psilocephala kijabea Séguy, 1938 : 334. Holotype ♀, KENYA (MP) [examined].
Thereva nitidiventris Kröber, 1939 : 395. Holotype ♀, KENYA (BMNH) [examined]. **Syn. n.**

DIAGNOSIS AND REDESCRIPTION. Only ♀ known; very similar to *aethiopica* described above.

Head with the proboscis distinctly shorter than in *aethiopica*, not reaching to level of antennal bases. Palpi almost as long as proboscis. The blackish frontal area more glossy than in *aethiopica*.

Thorax with the same very striking mesonotal pattern consisting of three brownish black longitudinal bands separated by two broad whitish grey stripes, *Dc* setae absent. 1–2 *sa* setae.

Wings and *legs* practically as in *aethiopica*.

Abdomen. Posterior margins of tergites 2–3 with much narrower bands of whitish grey tomentum than in *aethiopica*, occupying less than one-sixth of tergal length. Tergite 4 without tomentum on postero-lateral corners. Tergites 5–6 with lateral areas of tomentum, and tergites 7–8 entirely glossy black.

Total length 9·6–10·3 mm.

REMARKS. Séguy described his *kijabea* from a single female specimen from 'Kenya: Kijabé, Kikuyu, 2100 m'. The following year Kröber described *nitidiventris*, probably also from one female specimen, from 'Kenya: Naivasha, vii. 1937 (H. J. A. Turner)'. Both species come from the highlands within 60 km NW. of Nairobi and are evidently conspecific.

MATERIAL EXAMINED.

Holotype ♀ of *kijabea*, KENYA: Kijabé, Kikuyu, 2100 m, 1932–33 (*C. Arambourg, P. A. Chappuis & R. Jeannel*) (MP). Holotype ♀ of *nitidiventris*, KENYA: Naivasha, vii.1937 (*H. J. A. Turner*) (BMNH).

KENYA: Naivasha, 1 ♀, iv. 1937, 2 ♀, iv.1940 (*H. J. A. Turner*) (BMNH & ZMC).

Pseudothereva unifasciata (Kröber) **comb. n.**

(Text-figs 330, 333)

Thereva unifasciata Kröber, 1913 : 62; Kröber, 1931 : 133. Holotype ♀, ETHIOPIA (ZMB) [examined].

DIAGNOSIS. ♀. Face rather short-haired as in *aethiopica* and *kijabea* but frons entirely subshiny blackish, not distinctly tomentose on lower part, and only tergites 2 and 5 with small areas of greyish tomentum.

♂. Unknown.

REDESCRIPTION. ♀. *Head* (Text-figs 330, 333). Facial index 0·90. Frons widening strongly below, transversely wrinkled and depressed above. Colour uniformly black and subshining, i.e. with thin whitish grey tomentum. From antennal level down on to face the tomentum is thicker whitish grey. Pile of frons and face black, but whitish hairs present on middle of face. Occiput whitish grey tomentose and with short whitish pile. 6 rather short post-ocular setae on each side. A few occipital setae below these. Proboscis reaching well beyond level of antennal bases. Palpi shorter than proboscis, dark brownish and with whitish and dark hairs. Antennae black, with grey tomentum. Pile on segment 1 rather short.

Thorax black and subshining, as are also the upper pleura because of rather thin greyish tomentum. Mesonotum with a dull blackish middle stripe. Mesonotal pile short and consisting of black and yellowish hairs. 2 *sa* setae on each side. *Dc* setae absent.

Wings. Cell M_3 short-petiolate. Vein R_4 with a straight proximal section, apical section forming a slightly deep curve. Colour uniformly greyish brown without any infuscation. Veins rather pale brownish. Halteres blackish brown.

Legs. F_1 with 2 weak *av* setae. F_2 without *av* setae. F_3 with 6 weak *av* setae. Tibiae with the usual rows of setae. Femora blackish with short pale hairs. Tibiae and metatarsi of p_2 and p_3 brownish yellow. Tips of tibiae and other tarsal segments blackish.

Abdomen. Tergites shining black, tergite 2 with a broad, whitish hind-marginal seam. Small areas of whitish grey tomentum laterally along posterior margin of tergite 2 and laterally on tergite 5. Sternites blackish with thin tomentum anteriorly. Abdominal pile short and sparse, erect and black on all sternites except sternites 1–2.

Total length 8·6 mm.

MATERIAL EXAMINED.

Holotype ♀, ETHIOPIA: 'Abyssinia', Ehrbg. (ZMB). It is not absolutely certain that the holotype comes from a locality within the present boundaries of Ethiopia.

Pseudothereva parviseta **sp. n.**

(Text-figs 332, 335, 343–350)

DIAGNOSIS. ♂. Easily distinguished from *aethiopica* by the following combination of characters: genae with brownish black hairs, numerous post-ocular setae, almost uniformly greyish black mesonotum, and distinctly banded abdomen.

♀. Face with very long pile. Only tergites 2–3 with small areas of greyish tomentum postero-laterally.

DESCRIPTION. ♂. *Head* (Text-fig. 335). Facial index 0·87. Proboscis reaching beyond level of antennal bases; labella large. Palpi long and slender, almost reaching tip of proboscis, greyish, with whitish pile. Upper corner of frons subshining brownish black and bare. Rest of frons and other parts of head whitish grey to silvery whitish tomentose. Pile of head very long, blackish on frons and lateral parts of face, whitish on middle of face, brownish black on genae, and whitish on occiput. Numerous long and hair-like post-ocular setae; about 30 on each side. Only a few occipital setae present below the post-ocular row. First and second antennal segments black with greyish tomentum. Third segment and style dirty brownish grey. First segment with long whitish hairs basally, in apical half with numerous stiff, black setae.

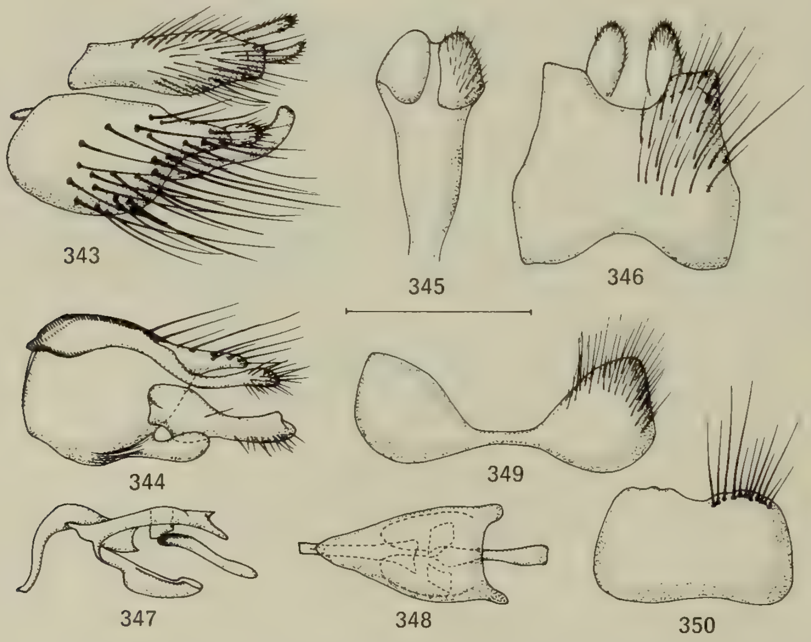
Thorax. Mesonotum greyish black, subshining, with two indistinct and narrow paler greyish stripes; lateral parts also paler greyish tomentose. Mesonotal pile long and consisting of both whitish and black hairs. Scutellum coloured like the mesonotum and with exclusively whitish pile. Pleura whitish grey with whitish pile. 1–2 *sa* setae present. *Dc* setae absent.

Wings. Cell M_3 rather broadly open. Vein R_4 with proximal section almost straight, apical section with a deep curve. Colour hyaline, with a greyish brown tinge. Veins and stigma brownish black. Clouding around cross-veins and fork of R_{4+5} totally absent. Knob of halteres brownish black.

Legs. F_1 and f_2 without *av* setae. F_3 with 4–5 *av* setae. T_1 with 3–5 *ad* and *pv* setae, but *pd* setae absent, a unique character. T_2 and t_3 with setae in all four positions: *ad*, *pd*, *av* and *pv*. Coxae whitish grey like the pleura. Femora brownish black, slightly yellowish brown at extreme tip, only indistinctly tomentose, and with mainly whitish hairs. Tibiae and tarsi yellowish brown, tips of tibiae and last tarsal segments darkened.

Abdomen. Tergites 2–4 with shining blackish anterior bands, the rest of these tergites silvery whitish grey tomentose. Along the mid-line the blackish bands occupying about two-thirds of tergite 2, half of tergite 3, and one-fourth of tergite 4, but all bands narrow towards lateral margin. Tergites 5–7 entirely silvery whitish grey tomentose. Tergal pile very long, especially laterally, and whitish, except on the blackish bands, where the pile is shorter and blackish. Sternites brownish black, but anterior sternites whitish grey tomentose, especially on posterior parts. Sternal pile whitish.

Terminalia (Text-figs 343–350). Epandrium and gonocoxites brownish black and shining, with blackish pile. Epandrium as in Text-fig. 346. Paraproct continuing into a common sclerite (Text-fig. 345). Gonocoxite in lateral view (Text-fig. 343) with upper posterior margin strongly projecting. Distal end of dorsal gonocoxal process (Text-fig. 343) only slightly overhanging posterior projection on gonocoxite. It has a much lower position than usual and is thus hidden behind the gonocoxal projection in lateral view. Seen from inside (Text-fig. 344) the down-curved position of the dorsal gonocoxal process is distinctly visible. Stylus (Text-fig. 344) remarkably short and relatively wide. Ventral lobe formed as in Text-fig. 344. Phallus long and in lateral view (Text-fig. 347) abruptly curved for more than 90 degrees near its base, the tip itself being slightly upcurved. In dorsal view (Text-fig. 348) the phallus gradually decreasing in width towards tip; the ventral proximal part of the tube visible between the angle formed by the dorsal and ventral apodemes. Dorsal apodeme slightly curved, in dorsal view (Text-fig. 348) gradually increasing in width, distal margin with a broad emargination. Ventral



FIGS 343–350. Male terminalia of *Pseudothereva parviseta*, holotype. 343, genitalia in lateral view; 344, right gonocoxite in interior view; 345, paraproct; 346, epandrium in dorsal view; 347, aedeagus in lateral view; 348, aedeagus in dorsal view; 349, tergite 8; 350, sternite 8. Scale: 0·5 mm.

apodeme shaped like a deep but narrow trough. Ejaculatory apodeme simple, with two additional small sclerites at its base. Tergite 8: Text-fig. 349. Sternite 8: Text-fig. 350.

♀. *Head* (Text-fig. 332). Facial index 0·93. Frons comparatively narrow above and gradually widening below, mainly shining blackish, only narrowly whitish grey tomentose above antennae. Rest of head whitish grey to grey tomentose. Pile coloured as in male, but shorter. Post-ocular setae fewer (about 10 on each side), and shorter but stronger. A similar number of occipital setae. Antennae as in male, but third segment sometimes darker. Otherwise as in male.

Thorax. Mesonotum coloured as in male, but the two pale greyish stripes slightly broader and more distinct. Pile short and consisting of pale and black hairs. Rest as in male. 2 + 2 *sa* setae. *Dc* setae absent.

Wings as described for male.

Legs apparently with the same chaetotaxy and colour as in the male. T_1 sometimes with a single small *pd* seta near middle.

Abdomen. Tergites practically entirely shining blackish, seen from above and laterally with ill-defined whitish grey tomentose bands along posterior margins of tergites. Abdominal pile short, with pale adpressed hairs dominating on tergites 2–3, but black erect hairs on the following tergites. 7 + 7 rather short, pointed spines.

Total length 8·6–10·0 mm.

MATERIAL EXAMINED.

Holotype ♂, SOUTH AFRICA: Natal, Maritzburg, 1913 (*C. Akerman*) (NM).

Paratypes. SOUTH AFRICA: Natal, Howick, 1 ♂, 1 ♀ (*C. P. Cregoe*) (BMNH); same locality, 1 ♂, Distant Coll. (BMNH); Natal, Winklerspruit, 1 ♀, v. 1917 (*C. Akerman*) (NM); Pondoland, Port St John, 1 ♀, 5–30.iv.1923 (*R. E. Turner*) (BMNH); same locality, 1 ♂, 10–22.ii.1955 (*A. J. T. Janse*) (TM).

THEREVA Latreille

Thereva Latreille, 1796 : 167. Type-species: *Musca plebeja* Linné, by subsequent monotypy (Latreille, 1802 : 441).

DESCRIPTION. *Head*. Male eyes touching, or nearly touching for a shorter or longer distance. Eye facets of equal or almost equal size. Face broad when compared with height of head, as facial margins are strongly divergent from level of antennae down to bottom of eyes. Facial indices varying between 0·94 and 1·27, i.e. distance between lower corner of eyes usually exceeding total height of head; only the male of *Thereva reclusa* has a lower facial index: 0·83. Female frons (Text-figs 351, 352, 357, 358, 361–364) always broad and with a pattern formed by differently coloured tomentum in the *analis*- and *turneri*-groups, while the frons in females of the *seminitida*-group has a shining black callus or two such calli. The gena is moderately deep in lateral view, and very wide in frontal view. Frons always haired, and face also haired. There is a great deal of interspecific variation in the number of post-ocular and occipital setae. Antennae simple, the relative lengths of first and third segments rather variable (cf. Text-figs 353–356, 359, 360, 365–369). Pile on first segment also varying in length. Style varying in length, two-segmented and with an apical spine. Proboscis usually normal, i.e. reaching as far as or slightly beyond level of antennal bases, but with tendencies towards reduction in a few species. Palpi one-segmented and vermiform.

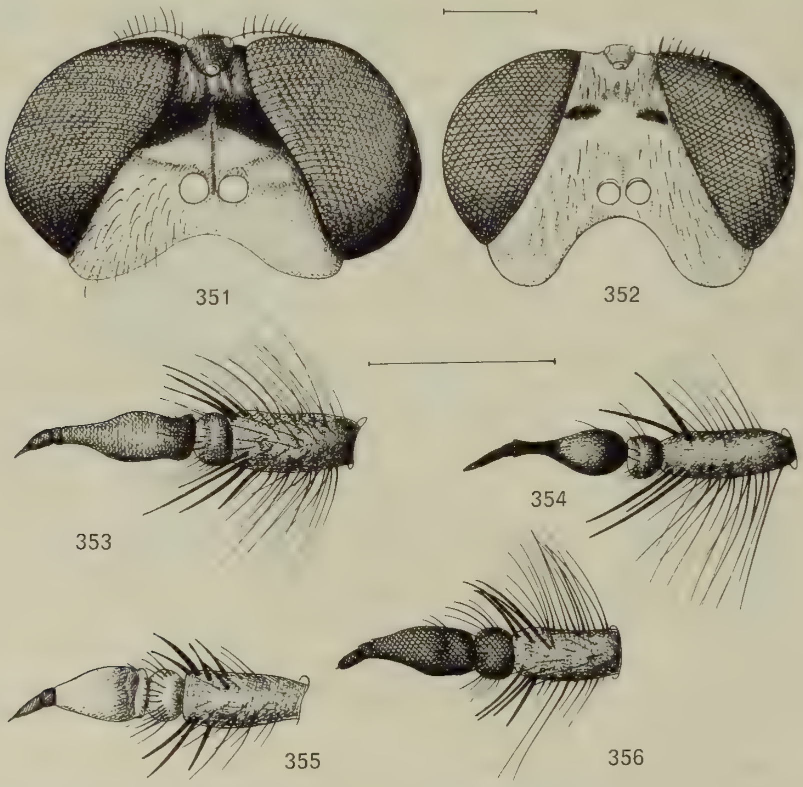
Thorax. Mesonotum with 3–5 notopleural, 1–2 supraalar and 1 postalar setae. 0–2 pairs of dorsocentral setae. Scutellum with 4 strong setae. Prosternum with long hairs on whole surface. Sternopleuron with long hairs on most of its surface, even on the ventral and anterior parts.

Wings. Cell M_3 open or closed. Cell R_4 wide towards apex, usually 1·6–2·2 times as long as wide between tips of veins R_4 and R_5, only in *turneri*-group narrower: 2·4–2·6 times as long as wide.

Legs. Cx_1 and cx_2 with long hairs on anterior and posterior surfaces. Femora usually with anteroventral setae, or these are absent on f_1 and/or f_2 only. T_1 with anterodorsal, posterodorsal and posteroventral setae, and t_2 and t_3 with rows of setae in all four positions, i.e. anteroventral setae also present. All femoral and tibial setae comparatively long, usually longer than tibial diameter.

Abdomen. Rather more broadly built than in the previous genera, and more tapering. Pattern very variable, from entirely whitish grey tomentose to entirely polished black; very often banded.

Male terminalia. Epandrium always broader than long along the mid-line, and especially in the *seminitida*-group very constricted in middle. Paraproct in the *analis*-group very weak and not continuing into sclerotizations of the intersegmental membrane; in the *turneri*-group continuing into a narrow sclerotization of the intersegmental membrane; and in the *seminitida*-group separated from paired sclerotizations in the intersegmental membrane which form lateral flaps beneath the epandrium. Gonocoxite usually broadly rounded posteriorly, often with a more or less distinct projection. Distal end of dorsal gonocoxal process long and finger-shaped, often reaching to or beyond level of posterior corner of epandrium. Stylus and ventral

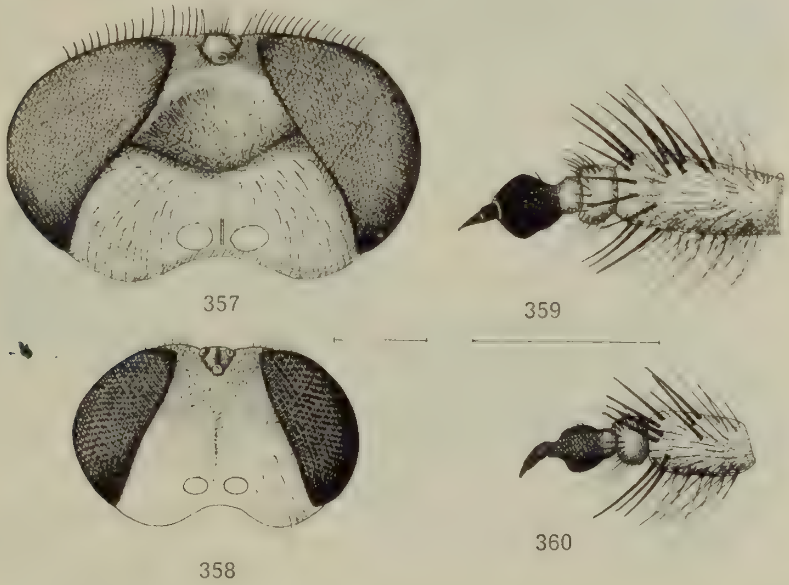


FIGS 351–356. *Thereva analis*-group. 351, 352, female heads in frontal view; 353–356, antennae. 351, *T. analis*; 352, *T. reclusa*; 353, *T. analis*, ♂ holotype; 354, *T. congoensis*, ♂ holotype; 355, *T. reclusa*, ♀; 356, *T. reclusa*, ♂ holotype. Scale: 0·5 mm.

lobe well-developed. Hypandrium present as a narrow sclerite between the ventral basal part of gonocoxites. Aedeagus simple; phallic part comparatively long, narrow and curved in lateral view; in dorsal view several times wider proximally than distally. Dorsal apodeme in dorsal view never narrower than proximal part of phallus. Ejaculatory apodeme simple. Tergite 8 constricted in middle, but less so in the *turneri*-group. Sternite 8 of rather variable shape.

REMARKS. Eleven species of *Thereva* are known to occur in Africa south of the Sahara. The genus seems to be restricted to the continental part of the Ethiopian region, as no representatives are so far known from Madagascar or from other islands belonging to the region. This fact indicates either that the genus is a relatively recent evolutionary group, or that it has penetrated into the Ethiopian region from a comparatively recent date, or both.

A great many species from all zoogeographical regions have been described into *Thereva*, but future research will certainly show that *Thereva* in a strictly monophyletic sense is primarily a Holarctic group, with many species in the Nearctic and Palaearctic regions. Based on a study of the type-species, *plebeja*, and of many other European species, the following synapomorphic characters can be listed: face always strongly pilose; head low and wide, i.e. the distance between lower corner of eyes usually longer than height of head; female frons usually with one or two polished black calli, the callus rarely secondarily covered with tomentum; a relatively high number (4-5) of notopleural setae; pile present on all the pleura,



FIGS 357–360. *Thereva turneri*-group, 357, 358, female heads in frontal view; 359–360, antennae. 357, *T. curticornis*; 358, *T. globulicornis*; 359, *T. curticornis*, ♀; 360, *T. globulicornis*, ♂ holotype. Scale: 0·5 mm.

prosternum and coxae; abdomen broadly built; epandrium very constricted along the mid-line; two lateral flaps present on underside of epandrium.

The Ethiopian species of *Thereva* clearly fall into three groups. The largest and most widespread is the *seminitida*-group, which is represented by 5 species, one of which includes 3 subspecies. The species of the *seminitida*-group represent the most typical *Thereva*, and are closely related to the dominant Holarctic stock of species, above all to the *nobilitata*-group. In Africa the *seminitida*-group occurs mainly in the afro-alpine areas and has an obviously relic distribution pattern. The only non-alpine species is *Thereva capensis* from the Cape area. This species is a fine example of parallelism on the specific level, as it closely resembles *Thereva fuscipennis* Zetterstedt from Scandinavia.

The other two species-groups in the Ethiopian region are the *analis*-group and the *turneri*-group, both of which contain three species. While the *analis*-group is certainly a monophyletic group, the *turneri*-group is not as obviously one. The relationship of these two groups with the *seminitida*-group (representing *Thereva* in its strictest sense) is not at all clear. It cannot be ruled out that the *turneri* + *analis*-groups represent a different evolutionary line from that leading to *Thereva* in the strictest sense; in other words, the genus *Thereva* in the sense of the present paper is a polyphyletic group. Both the external morphology and the structure of the male terminalia indicate that the *analis*- and *turneri*-groups are derived from the *Irwiniella*-complex of species. Until more information is available, however, it seems justifiable to place the species of all three groups in *Thereva*, though this is certainly a rather conservative treatment and future research will probably divide the genus up still further.

KEY TO ETHIOPIAN SPECIES OF *THEREVA*

MALES

1 Abdomen entirely whitish grey tomentose and with exclusively whitish pile (*analis*-group) 2

– Abdomen not entirely whitish grey tomentose, often extensively darkened, or at least with brownish or blackish anterior bands on the first tergites 4

2 Mesonotum practically uniformly greyish; *dc* setae present. Antennal style about half as long as third antennal segment, which is remarkably slender apically (Text-fig. 354) . . . . ***congoensis*** (p. 313)

– Mesonotum greyish with 3 or 4 more or less distinct, brownish grey to brownish bands; *dc* setae absent. Antennal style only about one-third as long as third antennal segment (Text-fig. 353), or if longer, then third segment not slender apically (Text-figs 355–356) 3

3 Genae evenly rounded, and with tomentum and whitish pile similar to that on lower face and occiput. Epandrium rather long (Text-fig. 375) . . . ***analis*** (p. 310)

– Anterior part of genae slightly swollen, the posterior surface of this swollen part dull black and with short, stiff black hairs. Epandrium short (Text-fig. 388) ***reclusa*** (p. 315)

4 At least tergites 2–4 very distinctly banded: anterior parts shining black to brownish black, posterior parts whitish grey tomentose. Pile long and whitish (*turneri*-group) 5

– Tergites 2–4 only indistinctly banded, mostly blackish, brownish grey or greyish and without tomentum; or posterior corners of tergites with greyish tomentum, which never forms distinctly demarcated bands along the posterior margin (*seminitida*-group) 6

5 T_1 with 2–3 *ad* and *pd* setae which are very long and erect. Tergites with narrow, subshining brownish black anterior bands . . . . . ***globulicornis*** (p. 319)

– T_1 with 4–10 *ad* and *pd* setae which are moderately long and more decumbent. Tergites with broader shining black anterior bands . . . . . ***turneri*** (p. 317)

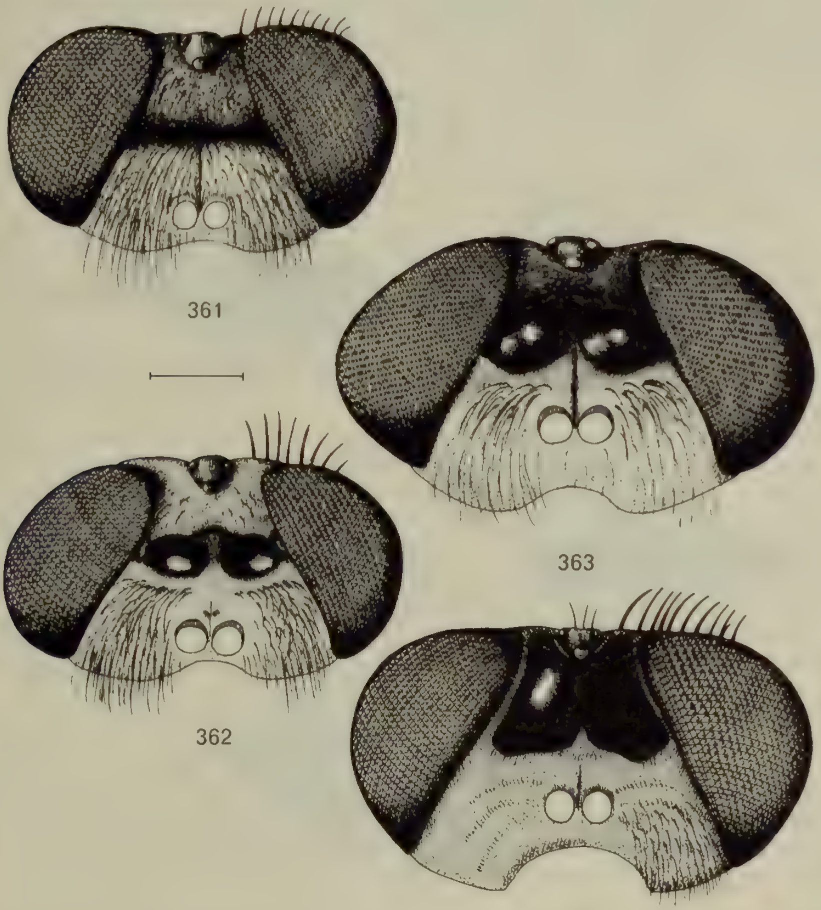
6 F_3 with *pv* setae at base . . . . . . species near ***bipunctata*** (p. 334)

– F_3 without *pv* setae at base (*seminitida*-subgroup) 7

7 *Dc* setae absent. Only 1 *sa* seta on each side 8

– *Dc* setae present. Usually 2 *sa* setae on each side 9

8 Sternites as well as postero-lateral corners of tergites distinctly yellowish brown. (Kenya–Tanzania) . . . . . . ***seminitida seminitida*** (p. 324



FIGS 361–364. *Thereva seminitida*-group, female heads in frontal view. 361, *T. seminitida*; 362, *T. chillaloensis*; 363, *T. tuberculifrons*; 364, *T. capensis*. Scale: 0·5 mm.

– Sternites and postero-lateral corners of tergites dark greyish tomentose, but all sternites with yellowish brown hind-marginal seams. Terminalia greyish black. (Ethiopia) . . . . ***chillaloensis*** (p. 327)

9 Proboscis short, about half as long as distance from base of proboscis to antennal bases 10

– Proboscis longer, at least three-quarters as long as distance from base of proboscis to antennal bases 11

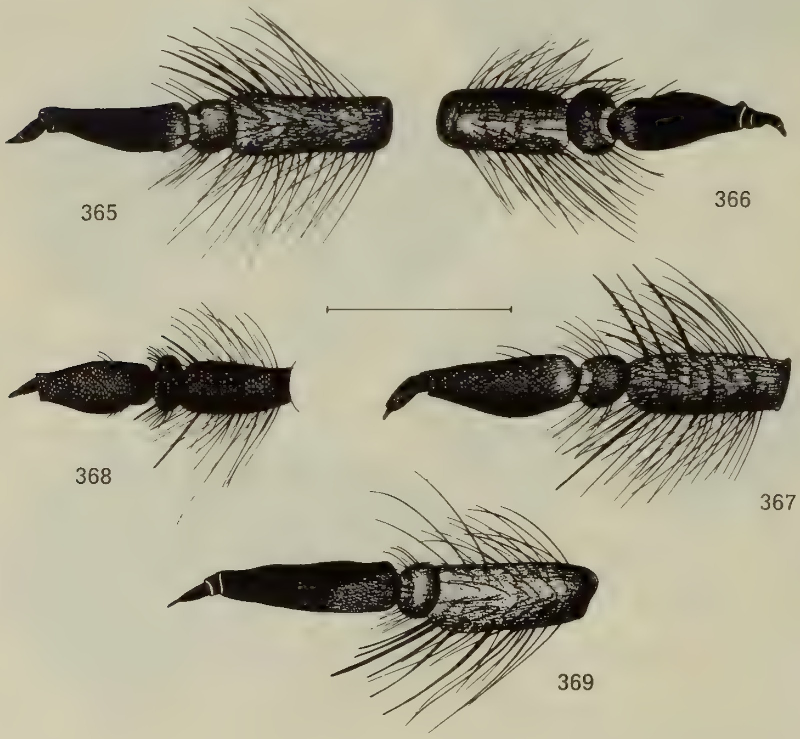
10 Larger species, 9·0–10·7 mm. At least 12 very long and slender post-ocular setae on each side. F_3 with exclusively yellowish adpressed hairs on anterior surface. Antennae long (Text-fig. 369). (Cape Prov.) . . . . ***capensis*** (p. 332)

– Smaller species, less than 7 mm. At most 8 post-ocular setae, which are short and slender. F_3 with predominantly blackish adpressed hairs on anterior surface. Antennae short (Text-fig. 368). (Natal) . . . . . ***natalensis*** (p. 330)

11 Scutellum distinctly more than twice as wide as long along the mid-line. Head in profile with tip of proboscis not reaching to level of antennal bases . . . 12

– Scutellum not twice as wide as long along the mid-line. Head in profile with tip of proboscis extending beyond level of antennal bases . ***seminitida occidentalis*** (p. 325)

12 All tergites exclusively blackish except for paler hind-marginal seams. Pile on lateral parts of tergites black. 2 *sa* setae on each side ***seminitida stuckenbergi*** (p. 326)



FIGS 365–369. *Thereva seminitida*-group, antennae. 365. *T. s. seminitida*, ♂; 366, *T. chillaloensis*, ♂ holotype; 367, *T. tuberculifrons*, ♂ lectotype; 368, *T. natalensis*, ♂ holotype; 369, *T. capensis*, ♂ holotype. Scale: 0·5 mm.

– All tergites at least partly greyish tomentose posteriorly, and terminal tergites nearly entirely greyish tomentose. Pile on lateral parts of tergites mainly pale. Only 1 *sa* seta on each side . . . . ***tuberculifrons*** (p. 328)

FEMALES

1 Frons with one or two shining black calli, or frons largely shining blackish (Text-figs 361–364) 2

– Frons without a shining black callus, or if with a darker pattern then it is formed by dark tomentose areas (Text-figs 351, 352) 8

2 Frons largely shining blackish (Text-fig. 364), the blackish colour also covering the areas laterally of the ocellar triangle. Paler tomentum restricted to lower frons and a narrow strip along eye-margins on upper frons . . ***capensis*** (p. 332)

– Frons often largely tomentose (Text-figs 361–363) with only a narrow indistinct black callus, or with a well-marked callus which leaves the upper frons including the areas laterally of the ocellar triangle tomentoes 3

3 Frons (Text-fig. 363) with large, well-marked callus, or (Text-fig. 362) with two well-marked, oval calli 4

– Frons (Text-fig. 361) largely brownish to brownish grey tomentose, often with a narrow blackish band on middle, which may be divided medially . . . 6

4 Frons (Text-fig. 363) with a large, strongly protruding frontal callus. Tergites entirely shining black . . . . ***tuberculifrons*** (p. 328)

– Frons (Text-fig. 362) with two well-marked calli. Tergites with shining black band and greyish tomentose areas behind 5

5 F_3 with a few short *pv* setae at base. Tergites 2–5 with continuous greyish tomentose bands along posterior margins . . . . species near ***bipunctata*** (p. 334)

– F_3 without *pv* setae at base. Tergites only greyish tomentose in postero-lateral corners . . . . ***chillaloensis*** (p. 327)

6 *Dc* setae absent. Only 1 *sa* seta on each side. Frons (Text-fig. 361) usually with a rather distinct, but narrow, black transverse band over the middle, which may be divided along the mid-line . . . . ***seminitida seminitida*** (p. 324)

– *Dc* setae present. 2 *sa* setae on each side. Frons with a more or less distinct blackish band over the middle, sometimes covered with brownish tomentum . 7

7 Postero-lateral corners of tergites 2–5 distinctly greyish tomentose. Distance between outer margin of upper ocelli and eye-margin equalling the width of an ocellus . . . . ***seminitida occidentalis*** (p. 325)

– Postero-lateral corners of tergites 2–5 without tomentum, but more brownish black in colour. Distance between outer margin of upper ocelli and eye-margin equalling twice the width of an ocellus . . . ***seminitida stuckenbergi*** (p. 326)

8 Frons (Text-figs 351, 352) tricoloured: dark brownish tomentose above, dull black on middle, and greyish tomentose below 9

– Frons (Text-figs 357, 358) not tricoloured 10

9 Middle of frons (Text-fig. 351) with a large continuous dull black band. Tergites 5–7 at least partly glossy black . . . . ***analis*** (p. 310)

– Middle of frons (Text-fig. 352) with two small, well-separated dull black spots. Tergites 5–7 entirely whitish grey tomentose . . . . . ***reclusa*** (p. 315)

10 Third antennal segment (Text-figs 359–360) very short, almost globular. Tergites 2–5 either entirely tomentose or at least with continuous, greyish tomentose posterior bands 11

– Third antennal segment (Text-fig. 365) normal, not globular. Tergites 2–5 at most with postero-lateral corners greyish tomentose 6

11 Abdomen entirely brownish grey tomentose . . . ***globulicornis*** (p. 319)

– Abdomen with large, shining black bands on anterior tergites . ***curticornis*** (p. 318)

THE *ANALIS*-GROUP

Three species are included in this group. The best-known species, *analis*, is widely distributed from Kenya in the north to Cape Province in the south, while the other two, *congoensis* and *reclusa*, are restricted to Zaire and Mozambique plus Natal province respectively.

Males of this group are characterized by the entirely whitish grey tomentose and haired abdomens, while the females have a frontal pattern consisting of differently coloured tomentum but never including shining black calli. The male terminalia also have some features in common. The structures ventrally beneath the epandrium and cerci are formed by a weakly sclerotized and pigmented paraproct (see Text-figs 374, 382), which continues into an intersegmental membrane which lacks any lateral sclerotized flaps as found in the *seminitida*-group (see Text-fig. 411). The gonocoxites have a small projection at the middle of the posterior surface, but not on the lower surface as in the *seminitida*-group; the styli have a long, slender tip; the aedeagi are very straight in lateral view, the phallic part being only slightly downcurved; and finally the aedeagi in dorsal view also have a similar appearance, with the distal margin of the dorsal apodeme convexly rounded and not ending in a narrow projecting part as in the *seminitida*-group nor with a concave incision as in the *turneri*-group.

The *analis*-group is certainly a monophyletic unit. The species, especially *analis*, are very similar to the Palaearctic *Thereva annulata* (Fabricius) in general appearance. This similarity is, however, only superficial as the male terminalia are very different in fundamental structure.

Thereva analis Kröber

(Text-figs 351, 353, 370–377)

Thereva analis Kröber, 1912 : 405; Kröber, 1931 : 132. Holotype ♂, SOUTH AFRICA (NMW) [examined].

? *Thereva argentea* Kröber, 1912 : 401; Kröber, 1931 : 132. Holotype ♂, SOUTH AFRICA (destroyed).

[*Thereva albohirta* Ricardo sensu Kröber, 1933 : 298. Misidentification.]

DIAGNOSIS. ♂. Abdomen entirely whitish grey tomentose and with whitish pile. Mesonotum greyish with 3 or 4 darker bands and without *dc* setae. Genae evenly rounded and with similar colour and pile as on lower occiput.

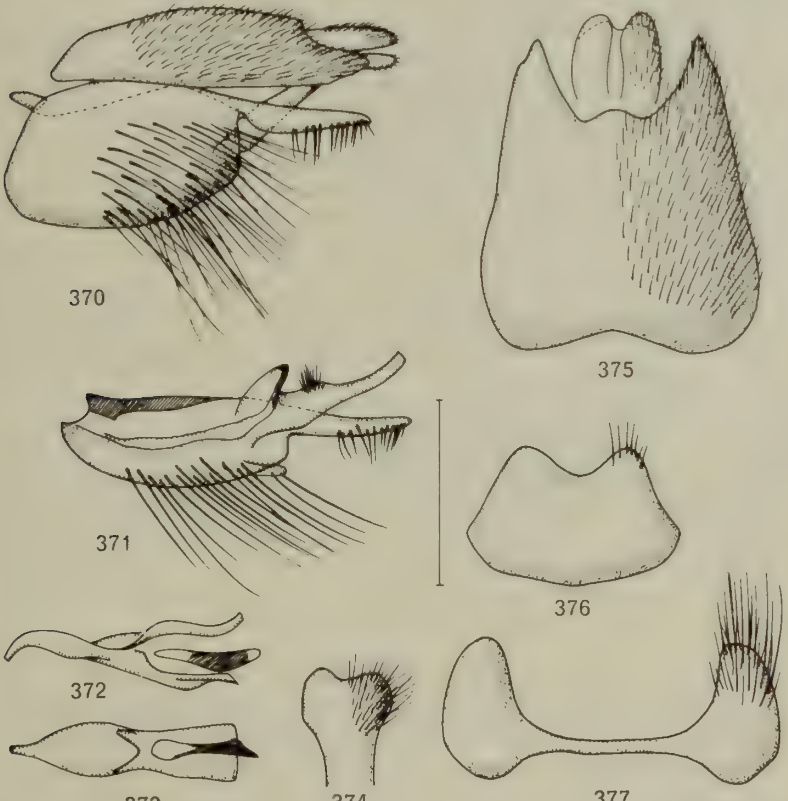
♀. Frons with a continuous dull black band over the middle and with tergite 7 glossy black.

REDESCRIPTION. ♂. *Head* (Text-fig. 353). Facial index about 1·07. Eyes practically touching for a short distance, separated by at most half width of anterior ocellus. Proboscis short and slender, not reaching to level of antennal bases. Palpi almost as long as proboscis, greyish and with whitish pile. Upper corner of frons bare and dark brownish to blackish. Lower frons, face and genae covered with thick silvery whitish grey tomentum. Lower frons with long black hairs. Face laterally with a variable number of black hairs: in some specimens only a few black hairs are present on upper part at level of antennae, but in others a broad stripe of black hairs runs down to lower margin of eye. Other parts of face with long whitish pile. Occiput greyish to silvery greyish tomentose, with long whitish pile. Only 4–6 rather short post-ocular setae on each side, and a similar or smaller number of occipital setae below the post-oculars. First and second antennal segments blackish with greyish tomentum; pile long and consisting of both black and whitish hairs, the former predominating dorsally, the latter ventrally. Third antennal segment slender, usually blackish, but apical half or more sometimes more or less brownish. Style black.

Thorax. The mesonotal pattern shows some variation. Ground colour always greyish. Three or four bands of a darker colour. When three bands are present, they are usually dark brownish, well-demarcated, and the middle band has no paler line. Four bands occur in specimens where the bands as a whole are paler, dark greyish to greyish brown, and where the middle band is divided along the mid line by a stripe of the same greyish colour as the ground-colour. All intermediates occur between specimens with an indistinctly marked mesonotum and specimens with a strongly marked mesonotum. Mesonotal pile very long and consisting of blackish and whitish hairs, the black hairs often few in number. Scutellum greyish to brownish grey, palest laterally, with long whitish hairs, the black hairs often few in number. Pleura whitish grey tomentose and with long whitish hairs. *Dc* setae absent.

Wings. Cell M_3 closed at wing-margin or short-petiolate. Vein R_4 strongly S-curved. Colour greyish hyaline, sometimes with a brownish tinge. Veins blackish. Stigma brownish black. Cross-veins and fork of R_{4+5} slightly brownish infuscated. Halteres with blackish knob.

Legs. F_1 and f_2 usually with a single, moderately long *av* seta. F_3 with 4–5 *av* setae in



FIGS 370–377. Male terminalia of *Thereva analis*. 370, genitalia in lateral view; 371, right gonocoxite in intero-ventral view; 372, aedeagus in lateral view; 373, aedeagus in dorsal view; 374, paraproct; 375, epandrium in dorsal view; 376, sternite 8; 377, tergite 8. Scale: 0·5 mm.

apical two-thirds. T_1 with 2–3 *ad*, *pd* and *pv* setae, most of them longer than tibial diameter. T_2 and t_3 with the usual four rows of setae, the *pv* setae of t_3 being short. Coxae greyish like the pleura. Femora blackish with greyish tomentum, with long whitish hairs, and also with black hairs on f_1. Tibiae and tarsi yellowish brown, tips of tibiae and last tarsal segments sometimes more or less darkened.

Abdomen. Tergites and sternites entirely whitish grey tomentose, often with a silvery appearance. Abdominal pile long and exclusively whitish.

Terminalia (Text-figs 370–377). Epandrium and gonocoxites yellowish, the former with varying degrees of greyish tomentum. Pile whitish. Epandrium as in Text-fig. 375. Paraproct as in Text-fig. 374, without any lateral sclerotizations of the intersegmental membrane. Distal end of dorsal gonocoxal process very long and reaching to level of posterior margin of epandrium. Gonocoxite in lateral view (Text-fig. 370) with posterior margin broadly rounded and with a small tubercle near base of dorsal gonocoxal process. Stylus (Text-fig. 371) long and slender apically. Phallus in lateral view (Text-fig. 372) directed upwards, then slightly downcurved; in dorsal view (Text-fig. 373) broad proximally and gradually tapering into a narrow tip. Dorsal apodeme (Text-fig. 373) almost rectangular, but slightly narrower proximally than proximal part of phallus. In lateral view (Text-fig. 372), dorsal apodeme upcurved distally. Tergite 8: Text-fig. 377. Sternite 8: Text-fig. 376.

Total length 8·6–10·6 mm.

♀. *Head* (Text-fig. 351). Facial index about 0·98. Frons tricoloured: upper third brownish grey to brownish tomentose; middle third blackish and indistinctly shining on middle; lower third of frons and also rest of head silvery whitish grey tomentose. Pile on all parts much shorter than in male. More numerous post-ocular and occipital setae than in male. Other head-characters as described for male.

Thorax. Mesonotum in all available females greyish in ground-colour and with three very distinct and well-demarcated bands of a dark brownish colour, thus having the same appearance as the darkest coloured males with the trace of a pale mid-line on anterior part. Mesonotal pile much shorter than in male and consisting mainly of black hairs. Otherwise as described for male.

Wings. Cell M_3 and vein R_4 as in male. Ground-colour of wing darker than in male, and appearing darker because of extensive infuscations along the veins. Otherwise as in male.

Legs. Chaetotaxy as in male. Femora less tomentose than in male, and tibiae apparently darker brownish in colour.

Abdomen. Tergites 2–3 shining black, with posterior corners greyish tomentose. At lateral margin the tomentose area occupies almost posterior half of tergite, but the tomentose area is only very narrow on middle of tergites. Tergite 4 entirely shining black. Tergites 5–6 shining blackish on middle and also on extreme lateral margin, but laterally with two ill-defined and only slightly greyish tomentose areas. Tergites 7–8 shining blackish. Sternites mainly blackish, anterior three or four sternites more or less greyish tomentose laterally. Pile on segments 4–7 short, black and erect, on sternites 2–3 pale, and on tergites 2–3 pale laterally and black and adpressed dorsally. 6 + 6 rather short and blunt-tipped terminal spines.

Total length 9·0–10·3 mm.

REMARKS. *Thereva argentea* Kröber (1912 : 401) is probably a synonym of *analis*. It was described from the male sex from 'Lichtenburg-Transvaal'. The type was stated to be in the Budapest Museum, and was destroyed in 1956. Judging from the description alone, it seem clear that Kröber only had a paler coloured specimen of *analis* before him when describing *argentea*.

Kröber (1933 : 298) did not recognize his own *analis* when working out material from the BMNH; both males and females of *analis* from various localities were identified as '*Thereva albohirta* Ric.'. Ricardo's species is endemic to Socotra and belongs to the genus *Irwiniella* (see p. 267).

Distribution. The species is widely distributed in eastern and southern Africa. It can be recorded from Kenya, Zambia, Rhodesia, South Africa and Lesotho.

Material examined.

Holotype ♂ of *analis*, South Africa: Bothaville, Orange-Freistaat, 20.xi.1898 (*Dr Brauns*) (NMW).

Kenya: Nanyuki (S.), 5 ♂, v.48 (*van Someren*) (BMNH); Kabete, 1 ♂, 18.xi.1918 (*T. J. Anderson*) (BMNH); Kikuyu, Mugugo, 2075 m., 11 ♂, 10–30.v.1970 (*D. J. Greathead*) (DJG); Nairobi, Dagoretti, 1 ♂, 26.v.1970 (*D. J. Greathead*) (DJG); Naivasha, 1 ♂, iv. 37, 1 ♂, vii. 37 (*H. J. A. Turner*) (BMNH); Ngong, 1 ♂ (*van Someren*) (BMNH); Nyeri (S.), 3 ♂, xii. 48 (*van Someren*); Narok, Masai Res., 1 ♂, 18.xi.1914 (*A. O. Lucknan*) (BMNH); Chyulu Hills, 1600 m, 2 ♂, iv. 38, 2 ~~♂, v. 38 (*Coryn*~~*don Mus.Expt.*) (BMNH); Kiambu, 1 ♂, 13.i.1931 (*R. H. le Pelley*) (BMNH). Zambia: Chisoka, 1 ♂, 1 ♀, 27.i.24 (*C. Smee*) (BMNH). Rhodesia: N. Vumba, 1 ♀, 7.viii.1964, 1 ♂, 29.viii.1964, 1 ♀, 31.viii.1964, 1 ♂, 1.ix.1964, 1 ♀, 29.iv.1965, 1 ♀, 12.ix.1965 (*D. Cookson*) (NM & ZMC). South Africa: Transvaal, Barberton, 1 ♂, 23.xii.1927 (*J. S. Taylor*) (NM); Transvaal, Tonetti, 1 ♂, 19.viii.1930 (*J. S. Taylor*) (NM); Transvaal, Woodbush west of Tzaneen, 1370 m, 1 ♂, 28.ii.1963 (*A. C. van Bruggen*) (NM); Transvaal, Randburg, 1 ♂, 12.ix.1964 (*H. N. Empey*) (MEI); Kraalfontein, Mara, 1 ♂, vi. 1918 (*H. G. Breijer*) (TM); Satara, 1 ♂, 6.v.1970 (*Vári & Potgieter*) (TM); Wonderboom, 1 ♂, 22.xii.04 (*C. J. Swierstra*) (TM); Umkomaas, 1 ♂, 14–23.vii.1917 (*P. A. Buxton*) (DM); Chobe River, Kabulabula, 1 ♀, 11–14.vii.1930 (*U.-L. Kal. Exp.*) (TM); Magude, 1 ♂, x. 1918 (*C. J. Swierstra*) (TM); Transvaal, Brakfontein, 4 ♂, 28–29.iii.1924 (*Lingnau*), *Thereva albohirta* Ric. det. Kröber, 1932 (DEI); Transvaal, nr Johannesburg, 2 ♂ (*A. J. Cholmley*) (BMNH); Johannesburg, 1830 m, 1 ♂, iii. 1899 (*J. P. Cregoe*) (BMNH); Natal, Drakensberg, Indument Forest, Cathedral Peak area, 1 ♂, 24.iv.1957 (*B. Stuckenberg*) (NM); Natal, Howick, 1 ♂ (*J. P. Cregoe*) (BMNH); Kloof, 24 km W. of Durban, 1 ♂, 26.ii.1915, 1 ♂, 6.viii.16 (*H. W. Bell-Marley*) (NM); Kloof, 1 ♂, 1.xi.15 (*Marley*) (SAM); Cape Province, Aliwal North, 1 ♂, xii. 1922 (*R. E. Turner*) (BMNH); Aliwal North, 1325 m, 1 ♀, 1–13.?.1923 (*R. E. Turner*) (BMNH). Lesotho: Mamathes, 3 ♀, 29.iii.1948, 1 ♂, 4.iv.1948 (*C. Jacot-Guillarmod*) (CJG). Khabos, Leribe Dist., 1 ♂, i. 1932 (*C. Jacot-Guillarmod*) (CJG).

***Thereva congoensis* sp. n.**

(Text-figs 354, 378–385)

Diagnosis. ♂. Abdomen entirely whitish grey tomentose as in *analis*, but mesonotum practically uniformly greyish and with distinct *dc* setae. Third antennal segment (Text-fig. 354) remarkably slender apically and with a long style.

♀. Unknown.

Description. ♂. *Head* (Text-fig. 354). Facial index 0·95. Eyes practically touching for a short distance. Proboscis reaching a little beyond level of antennal bases. Palpi shorter than proboscis, greyish with whitish hairs. Upper corner of frons bare and brownish grey tomentose. Lower frons and other parts of head whitish grey tomentose. Lower frons with moderately long, blackish pile. Face, genae and occiput with long whitish pile. Post-ocular setae long and hair-like, only 6 on each side; a similar number of occipital setae. First and second antennal segments blackish, with whitish grey tomentum, the pile long and consisting of both pale and blackish hairs. Third antennal segment brownish at middle, darkened basally and apically. Style black.

Thorax. Mesonotum practically uniformly greyish to whitish grey, without distinct stripes. Pile long and consisting of black and whitish hairs. Scutellum of the same colour as mesonotum, and with only whitish hairs. Pleura greyish with whitish pile. 1 or 2 *sa* setae. 1 pair of *dc* setae.

Wings. Cell M_3 short-petiolate. Vein R_4 strongly S-curved. Colour greyish hyaline. Veins and stigma pale brownish, slight shadows around cross-veins and fork of R_{4+5}. Knob of halteres dark.

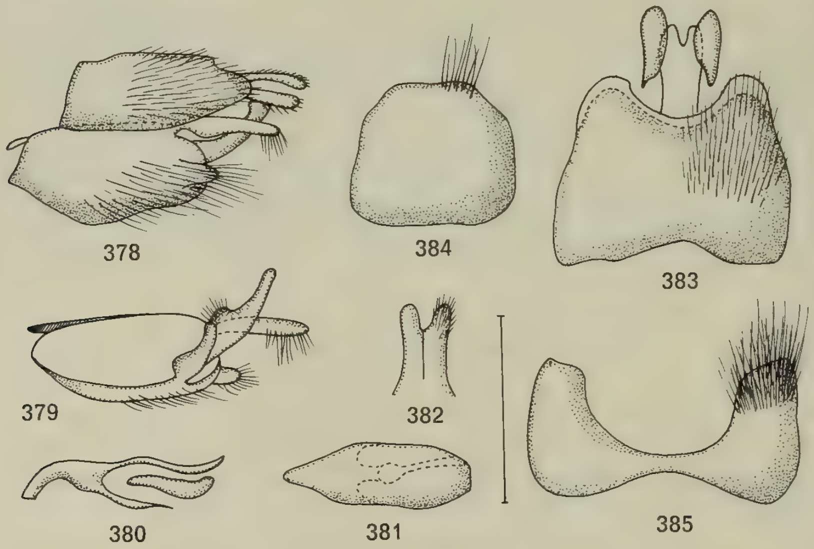
Legs. F_1 and f_2 without or with a single *av* seta. F_3 with 5–6 rather long *av* setae. Tibiae with the same arrangement of setae as in *analis*. Femora blackish with whitish grey tomentum, long and whitish pile, but with black hairs intermixed on posterior part of f_1. Tibiae and tarsi pale yellowish brown, tibiae at tips and last tarsal segments hardly darkened.

Abdomen. Tergites as well as sternites entirely whitish grey tomentose and with whitish pile.

Terminalia (Text-figs 378–385). Greyish tomentose and with short whitish pile. Epandrium as in Text-fig. 383, distinctly shorter than in *analis* (Text-fig. 375). Distal end of dorsal gonocoxal process reaching well beyond level of posterior margin of epandrium. Gonocoxite in lateral view (Text-fig. 378) with posterior margin rounded and with a distinct projection. Stylus (Text-fig. 379) rather short. Phallus in lateral view (Text-fig. 380) straight proximally and gently curved at about 45 degrees; in dorsal view (Text-fig. 381) broad proximally and gradually decreasing in width towards apex. Dorsal apodeme flat and almost straight (Text-fig. 380); in dorsal view rectangular, with distal corners rounded. Tergite 8: Text-fig. 385. Sternite 8: Text-fig. 384.

Total length about 7·5 mm.

♀. Unknown.



Figs 378–385. Male terminalia of *Thereva congoensis*, holotype. 378, genitalia in lateral view; 379, right gonocoxite in intero-lateral view; 380, aedeagus in lateral view; 381, aedeagus in dorsal view; 382, paraproct; 383, epandrium in dorsal view; 384, sternite 8; 385, tergite 8. Scale: 0·5 mm.

MATERIAL EXAMINED.

Holotype ♂, CONGO: Brazzaville, Mission Chari-Tchad, vii. 1904 (*Dr J. Decorse*) (MP).

Paratype ♂, No. 305, Coll. Mus. Congo (*Dr A. Fain*) (MCT).

***Thereva reclusa* sp. n.**

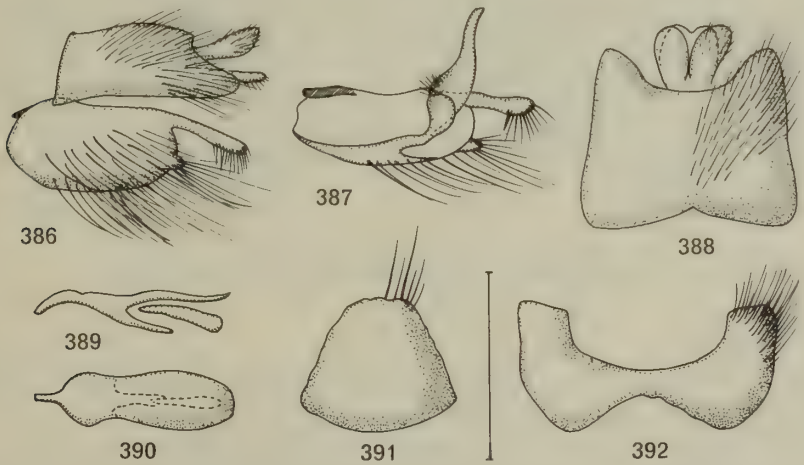
(Text-figs 352, 355, 356, 386–392)

DIAGNOSIS. ♂. Similar to *analis* in general appearance, but genae swollen anteriorly and the posterior surface of this swollen area dull black and with short stiff black hairs. Epandrium (Text-fig. 388) shorter than in *analis*.

♀. With two well-separated dull black patches on middle of frons; tergite 7 greyish tomentose.

DESCRIPTION. ♂. *Head* (Text-fig. 356). Facial index about 0·83. Eyes touching for rather a long distance. Proboscis nearly reaching to level of antennal bases. Palpi only slightly shorter than proboscis, greyish with whitish pile. Upper corner of frons bare and darkened on two small lateral patches. Rest of frons and other parts of head whitish grey tomentose, but genae darker from certain angles, and anterior part of genae slightly swollen. Pile on frons and lateral parts of face black and moderately long, on other parts of head whitish, but some stiff black hairs present behind the darkened swollen part of genae. About 12 postocular and occipital setae on each side, slender and moderately long. First and second antennal segments blackish with greyish tomentum; pile long and mainly black. Third antennal segment brownish, slightly darkened near base but actual base brownish. Style blackish.

Thorax. Mesonotum greyish to brownish grey and with four darker brownish bands, the two median bands being most distinct and separated only by an indistinct paler mid line. Lateral bands less distinct, especially in front. Mesonotal pile moderately long and consisting of both black and whitish hairs. Scutellum greyish, but greyish brown in front, pile whitish. Pleura greyish with whitish pile. Only 1 *sa* seta. *Dc* setae absent.



FIGS 386–392. Male terminalia of *Thereva reclusa*, holotype. 386, genitalia in lateral view; 387, right gonocoxite in intero-ventral view; 388, epandrium in dorsal view; 389, aedeagus in lateral view; 390, aedeagus in dorsal view; 391, sternite 8; 392, tergite 8. Scale: 0·5 mm.

Wings. Cell M_3 short-petiolate. Vein R_4 narrowly S-curved, proximal part almost straight. Colour hyaline, with a greyish brown tinge. Veins and stigma dark brownish. Cross-veins and fork of R_{4+5} brownish infuscate. Knob of halteres pale yellowish brown.

Legs. F_1 without *av* setae. F_2 with 1–2 *av* setae. F_3 with 5–6 *av* setae in apical two-thirds. T_1 with 2–3 *ad, pd* and *pv* setae. T_2 and T_3 with rows of setae in all four positions, but all setae comparatively short. Coxae greyish, like the pleura. Femora blackish with greyish tomentum. Femoral pile whitish, but with black hairs intermixed on posterior surface. Tibiae and tarsi yellowish brown, tips of tibiae and last tarsal segment only slightly darkened.

Abdomen. Tergites and sternites uniformly whitish grey tomentose and with long whitish hairs.

Terminalia (Text-figs 386–392). Epandrium and gonocoxites greyish tomentose, like the rest of the abdomen, and with exclusively whitish hairs. Epandrium as in Text-fig. 388. Paraproct and intersegmental membrane very weakly sclerotized and pigmented, not forming any distinctly marked sclerite. Distal end of dorsal gonocoxal process overhanging posterior margin of epandrium. Gonocoxite (Text-fig. 386) with posterior margin broadly rounded and provided with a short projection. Stylus as in Text-fig. 387. Phallus in lateral view (Text-fig. 389) only slightly down-curved, in dorsal view (Test-fig. 390) with almost circular proximal part and a short, narrow tip. Dorsal apodeme flat and straight in lateral view (Text-fig. 389), broadly oval in dorsal view (Text-fig. 390). Tergite 8: Text-fig. 392. Sternite 8: Text-fig. 391.

Total length 8·6 mm.

♀. *Head* (Text-figs 352, 355). Facial index almost 0·94. Upper frons brownish grey tomentose, with two oval and dull blackish spots laterally. Lower frons and rest of head whitish grey tomentose as in male, and genae also darker (dull blackish) from certain angles. Frons and face with a rather sparse pile of moderately long black hairs. Otherwise as in male, but antennal pile much shorter.

Thorax. Mesonotum more distinctly marked than in male, and the two median brown bands confluent, i.e. the pale median line absent or at least very indistinct. Scutellum more brownish than in male. Chaetotaxy as in male.

Wings as in male, but ground-colour darker and with distinct infuscations around both cross-veins and along longitudinal veins on apical half of wing.

Legs. F_1 and f_2 with 1–2 *av* setae. Chaetotaxy and colour as in male.

Abdomen. Tergites 2–4 with large, shining brownish black anterior bands, almost reaching posterior margin of tergites along the mid-line, but not reaching actual lateral margins. Lateral and posterior parts of these tergites whitish grey tomentose. Tergites 5–7 whitish grey tomentose. Tergite 8 shining blackish. Sternites 2–6 greyish to greyish brown, partly sub-shining. Sternite 8 shining black. Tergites 2–4 with whitish hairs laterally and black adpressed hairs on disc. Tergite 4 on middle, and tergites 5–8, with erect pile consisting of pale brownish hairs. Sternites also with erect pale brownish pile. 6 + 6 moderately long and rather pointed terminal spines.

Total length about 8 mm.

DISTRIBUTION: Mozambique and Natal Province in South Africa.

MATERIAL EXAMINED.

Holotype ♂, MOZAMBIQUE: Lourenço Marques, i. 1956 (*B. Stuckenberg*) (NM).

Paratypes. MOZAMBIQUE: 'Delagoa-Bai, Süd-Ost-Africa', 1 ♀ (*v. Röder*), det. *Psilocephala pallipes* Kröb. by Kröber, 1926 (ZIH); Delagoa Bay, 1 ♀ (*Monteiro*) (BMNH); same locality, 1 ♂, xi. 1921 (*Bell-Marley*) (DM). SOUTH AFRICA: Natal, 32 km S. of Ndumu Game Res., 100 m, 1 ♂, 3 ♀, 29.xi.1971 (*M. E. Irwin*) (NM & ZMC); Zululand, Manguzi River, m. Maputa, 1 ♂, xi–xii. 1945 (*H. W. Bell-Marley*) (DM).

THE *TURNERI*-GROUP

In this group are placed three species in which the males have abdominal tergites 2–4 distinctly banded and abdomen exclusively whitish haired. It is not clear whether the species form a monophyletic group. The male sex of only two species, *turneri* and *globulicornis* is known. The aedeagi of both these species have the dorsal apodeme with a concave distal margin which is neither convexly rounded as in the *analis*-group, nor has a narrow projection as in the *seminitida*-group. In both species the paraproct continues into a well-marked sclerotization of the intersegmental membrane. Cell R_4 is remarkably narrow in all species, 2·4–2·6 times as long as wide at apex.

The interspecific variability in tibial chaetotaxy, especially on t_1, is very unusual. In *turneri* the dorsal setae of t_1 are strong, very numerous and rather decumbent. The single female specimen available of *curticornis* has a similar arrangement of the tibial setae as in *turneri*. *T. globulicornis* has a 'normal' arrangement of the tibial setae, i.e. few in number and more erect.

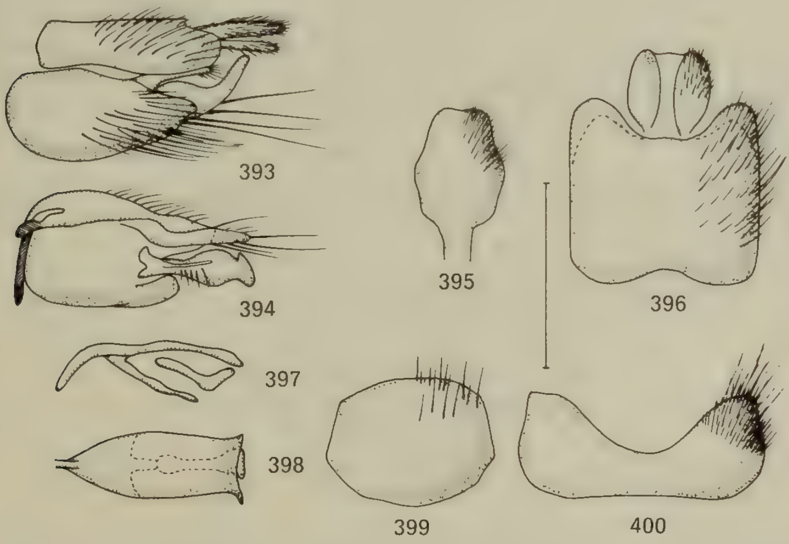
The females of this group usually have a broad frons, dulled by tomentum. The third antennal segment is short and constricted basally as in the genus *Caenophthalmus*.

Thereva turneri **sp. n.**

(Text-figs 393–400)

DIAGNOSIS. ♂. A greyish black species with distinctly banded abdomen which has exclusively whitish hairs. Tibiae unusually strong, and with numerous setae on dorsal surface, also on the *pd* surface on t_1.

♀. Unknown.



FIGS 393–400. Male terminalia of *Thereva turneri*, holotype. 393, genitalia in lateral view; 394, right gonocoxite in interior view; 395, paraproct; 396, epandrium in dorsal view; 397, aedeagus in lateral view; 398, aedeagus in dorsal view; 399, sternite 8; 400, tergite 8. Scale: 0·5 mm.

Description. ♂. *Head.* Facial index about 1·27. Eyes touching for rather a long distance. Upper facets slightly enlarged. Proboscis reaching to level of antennal bases. Palpi greyish with whitish pile. Upper frons narrowly brownish black. Rest of frons and other parts of head whitish grey to greyish tomentose. Pile on frons and lateral parts of face long and blackish, whitish on rest of head. More than 30 long, thin post-ocular setae on each side. Only a few occipital setae. First and second antennal segments intensely whitish grey tomentose and with a moderately long but rich pile of black setae and whitish hairs. Third segment lost.

Thorax. Mesonotum greyish, with three indistinctly marked brownish black bands. Mesonotal pile apparently exclusively whitish, and long. 1 *sa* seta on each side, *dc* setae absent. Scutellum greyish black with long whitish pile. Pleura whitish grey tomentose and with whitish hairs.

Wings. Cell M_3 closed at wing-margin. Vein R_4 with an almost straight proximal section, then rather suddenly bent and ending in a low curve. Colour uniformly greyish brown hyaline. Veins, stigma and halteres brownish black.

Legs. F_1 and f_2 apparently without *av* setae. F_3 with 4–5 short *av* setae. All tibiae with an unusually rich number of setae on dorsal surfaces, consisting of the usual rows of *ad* and *pd* setae and additional shorter setae in a true dorsal position; the *ad* and *pd* rows with more setae than usual. Femora blackish, thinly greyish tomentose and with whitish hairs. Tibiae stronger than usual and yellowish brown. Tarsi only slightly darker than tibiae.

Abdomen. Tergites 2–5 strongly banded, anterior parts black and shining, posterior parts whitish grey. Black anterior bands occupying half tergal length on tergite 2, more than half tergal length on tergite 3, and less than half tergal length on tergites 4–5. Posterior tergites entirely whitish grey tomentose. Tergites 2–5 also with whitish yellow, hind-marginal seams. Sternites mainly greyish. Abdominal pile long and whitish.

Terminalia (Text-figs 393–400). Brownish yellow, slightly greyish tomentose and with whitish hairs. Epandrium (Text-fig. 396) nearly square, with a moderately deep incision on anterior and posterior margins. Paraproct continuing into a distinct sclerite (Text-fig. 395). Gonocoxite in lateral view (Text-fig. 393) with narrowly rounded margin. Distal end of dorsal gonocoxal process reaching to level of posterior margin of epandrium. Stylus (Text-fig. 394) of rather a complicated shape. Ventral lobe very short. Phallus in lateral view (Text-fig. 397) very slender and gently downcurved, in dorsal view (Text-fig. 398) very broad proximally and rapidly narrowing. Dorsal apodeme flat and almost rectangular. Ejaculatory apodeme bent. Tergite 8: Text-fig. 400. Sternite 8: Text-fig. 399.

♀. Unknown.

Remarks. See discussion above under the *turneri*-group.

MATERIAL EXAMINED.

Holotype ♂, South Africa: Cape Prov., Montagu, 1–21.x.1924 (*R. E. Turner*) (BMNH).

Thereva curticornis Kröber

(Text-figs 357, 359)

Thereva curticornis Kröber, 1912 : 401 [nec Kröber, 1931 : 131]. Holotype ♀, South Africa (MB) (destroyed).

Diagnosis. ♂ unknown.

♀. Frons broad and entirely greyish to brownish grey tomentose, with third antennal segment (Text-fig. 359) extremely short and globular and with broad, shining blackish anterior bands on first tergites.

Redescription. ♀. *Head* (Text-figs 357, 359). Facial index 1·21. Frons broad and strongly widening downwards, with a depressed area above middle. Upper frons pale greyish brown tomentose, lower frons and other parts of head whitish grey to whitish tomentose. Frons with a moderate pile of black hairs, other parts of head with long, whitish pile. About 16 short post-ocular setae on each side and a similar number of occipital setae. Proboscis short. Palpi yellowish with whitish pile. First, second and base of third antennal segments whitish grey, first segment yellowish brown translucent. Rest of the very short third segment black, and style also black.

Thorax. Mesonotum and scutellum almost uniformly dark greyish brown, more greyish anteriorly and laterally, with two narrow and very indistinct paler stripes. Mesonotal pile rather short and consisting of black and whitish hairs. Scutellum and pleura with whitish pile. Pleura greyish tomentose. 2 *sa* setae on each side, and a pair of *dc* setae.

Wings. Cell M_3 short petiolate. Vein R_4 nearly straight in proximal half, then slightly downcurved distally. Colour uniformly and rather intensely brownish. Stigma and veins not much darker than rest. Halteres blackish.

Legs. F_1 without setae. F_2 with a single *av* seta. F_3 with 3–4 short *av* setae. Tibiae appearing stronger than usual (cf. *turneri*) and with a stronger pile on dorsal surface than is usual in the genus (as in *turneri*). The ventral rows are also rather rich in setae. Femora, tibiae and first tarsal segment dirty yellowish brown, femora only slightly tomentose and with whitish hairs.

Abdomen. Tergites 2–3 predominantly shining blackish, with only narrow posterior bands of whitish grey tomentum. Tergites 4–5 also with shining blackish, but narrower, anterior bands. Tergites 6–8 mainly shining brownish, only slightly tomentose laterally on tergite 6. Lateral parts of tergites yellowish brown translucent. Sternites mainly greyish tomentose, but distinctly yellowish brown translucent. Abdominal pile whitish on lateral parts of tergites 2–3 and on middle of sternites 2–3, short and blackish on rest. 6 + 6 broad and blunt-tipped terminal spines.

Total length 9·2 mm.

REMARKS. Kröber (1912 : 401) described *curticornis* from a female specimen from 'Kap Willowmore, Kapland'. The holotype was located in the Budapest Museum, and has therefore most probably been destroyed. The description given above is based on an obviously conspecific female specimen.

Kröber (1931 : 131) later gave a slightly different English translation of his original description, but the figure of the antenna is very different from the figure given in the original description. He may have had a different specimen before him when preparing this 1931 figure, and this specimen would have been identical with a specimen I received from the Transvaal Museum and which is labelled 'Capland, Willowmore, März 1916, Dr. Brauns' and 'Thereva curticornis Krb./det. Kröber 1927'. This specimen is not conspecific with the original *curticornis* and represents an undescribed species, which will not, however, be described until more material becomes available. The 1916 specimen is rather similar to true *curticornis*, but the antenna is differently shaped, the mesonotum and wings are paler, the abdomen is not so distinctly banded, and the tibiae have normal setae.

MATERIAL EXAMINED.

SOUTH AFRICA: Cape Prov., Seven Weeks Poort, 1 ♀, 17.xi.1940 (*G. van Son* (TM).

Thereva globulicornis sp. n.

(Text-figs 358, 360, 401–407)

DIAGNOSIS. ♂. A small, slender species with narrower and less distinctly demarcated dark tergal bands than in the preceding species, and with 'normal' tibial chaetotaxy. Third antennal segment (Text-fig. 360) shortened.

♀. With a broad and mostly mat brownish or greyish tomentose frons (Text-fig. 358), and a uniformly brownish grey tomentose abdomen.

DESCRIPTION. ♂. *Head* (Text-fig. 360). Facial index about 0·94. Eyes almost touching for a short distance. Upper facets distinctly enlarged. Proboscis short and slender, just reaching to level of antennal bases. Palpi as long as proboscis, pale yellowish and with whitish pile. All parts of head whitish grey to greyish tomentose. Frons with long black hairs, other parts of head with white hairs. 12–14 long and slender post-ocular setae on each side. A few occipital setae present, or occipital setae entirely absent. First and second antennal segments intensely whitish grey tomentose, first segment with whitish hairs and black setae apically and dorsally. Third antennal segment blackish grey to blackish, indistinctly paler brownish at the narrow base; remarkably short.

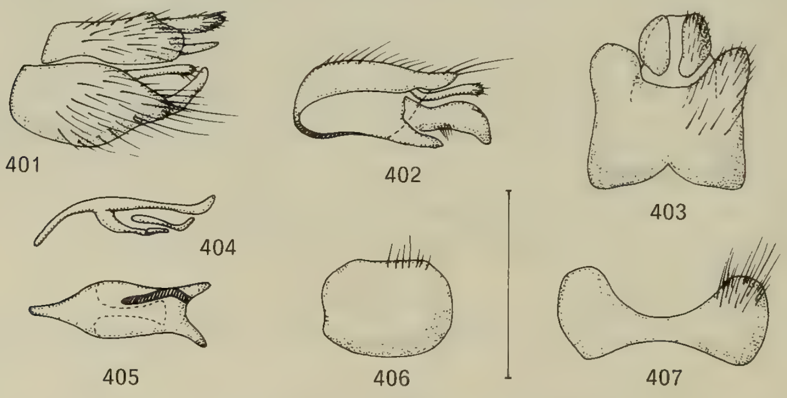
Thorax. Mesonotum largely brownish black to dark brownish and not shining, with two narrow paler greyish brown stripes and lateral parts of mesonotum also greyish brown tomentose. Scutellum brownish black. Mesonotal pile rather long and exclusively whitish. Pleura greyish with whitish pile. Usually only 1 *sa* seta present. *Dc* setae absent.

Wings. Cell M_3 closed, and shorter or longer petiolate. Vein R_4 with proximal section nearly straight, distal section forming a low curve. Colour hyaline with a whitish tinge. Veins and stigma brownish black, without any infuscation. Knob of halteres brownish black.

Legs. F_1 and f_2 without *av* setae, but f_2 sometimes with a single *pv* seta. F_3 with 3–5 *av* setae on apical half. T_1 with 2–3 *ad*, *pd* and *pv* setae, most of which are long and strong. T_2 with 2 or 3 strong setae in the normal four positions. T_3 with rows of 6–7 *ad*, *pd* and *av* setae, *pv* setae represented only by 2–3 very short setae. Coxae greyish like the pleura. Femora mostly greyish like the coxae, but distinctly yellowish brown at tips and sometimes more or less brownish on longitudinal streaks along both f_2 and f_3. Tibiae and tarsi yellowish brown, tips of tibiae and last tarsal segments indistinctly darkened.

Abdomen. Tergites mainly whitish grey tomentose, but tergites 2–5 with brownish black anterior bands; these bands occupying at most half tergal length, but not reaching lateral margins of tergites and narrowing along middle of tergites, the bands narrower on tergites 4–5 than on tergites 2–3. Sternites entirely whitish grey tomentose. Abdominal pile exclusively whitish, moderately long and rather sparse.

Terminalia (Text-figs 401–407). Epandrium and gonocoxites brownish, with more or less



FIGS 401–407. Male terminalia of *Thereva globulicornis*, holotype. 401, genitalia in lateral view; 402, right gonocoxite in interior view; 403, epandrium in dorsal view; 404, aedeagus in lateral view; 405, aedeagus in dorsal view; 406, sternite 8; 407, tergite 8, Scale: 0·5 mm.

grey tomentum, the pile mainly whitish. Epandrium as in Text-fig. 403. Gonocoxite in lateral view (Text-fig. 401) with posterior margin broadly projecting. Distal end of dorsal gonocoxal process (Text-fig. 401) very slender and slightly overhanging posterior margin of gonocoxite. Stylus (Text-fig. 402) short and wide, broadly pointed at tip. Ventral lobe (Text-fig. 402) small. Phallus long and narrow in lateral view (Text-fig. 404) and only slightly curved, while in dorsal view (Text-fig. 405) it is broad proximally and gradually decreases in width towards tip. Dorsal apodeme (Text-fig. 404) quite flat, in dorsal view (Text-fig. 405) with side-margins and apical margin broadly incurved. Ejaculatory apodeme with a bend near tip. Tergite 8: Text-fig. 407. Sternite 8: Text-fig. 406.

Total length 5·5–7·2 mm.

♀. *Head* (Text-fig. 358). Facial index almost 1·14. Frons entirely dulled, mainly brownish to greyish tomentose, becoming gradually paler greyish on lower part, with sparse, but rather long, blackish hairs. Other parts of head whitish grey tomentose and with whitish hairs. About 8–10 short and strong post-ocular setae. 5–6 occipital setae present on each side. Other characters as in male.

Thorax. Mesonotum paler than in male, as the dark brownish colour is restricted to three narrow bands, of which the middle one is linear anteriorly. Mesonotum otherwise greyish to yellowish grey tomentose. Mesonotal pile consisting of both whitish and blackish hairs.

Wings as in male, but ground-colour with a more brownish tinge.

Legs. Chaetotaxy of femora and tibiae as in male. Femora predominantly yellowish brown in colour, but darkened and with greyish tomentum in varying degrees, especially on lower surfaces, on f_1 and at apex of f_3, in one specimen entirely yellowish brown. Tibiae and tarsi coloured as in male.

Abdomen. Tergites practically uniformly greyish to greyish brown tomentose and slightly subshining from certain angles, only tergite 8 glossy black. Pile short, consisting of yellowish adpressed hairs on the disc of tergites 2–3 and of erect black hairs on the rest. Sternites more pale greyish tomentose, especially on anterior sternites. 7 + 7 short, slender terminal spines.

Total length 6·5–8·5 mm.

REMARKS. This species seems to be rather variable. The number of *sa* setae is not constant. The colour of the female frons varies from almost wholly greyish tomentose to practically brownish tomentose, and the colour of the femora is also variable (see description).

MATERIAL EXAMINED.

Holotype ♂, SOUTH AFRICA: Cape Prov., Pearly Beach, Bredasdorp (SAM).

Paratypes. SOUTH AFRICA: 6 ♂, 3 ♀, same data as holotype; Cape Prov., Buffalo Bay, 1 ♂, 26.xi.1967 (*H. K. Munro*) (NM); Cape Prov., False Bay, 3·2 km E. of Muizenburg, 2 ♂, 3.i.1972 (*Southern African Exp.*) (BMNH).

THE *SEMINITIDA*-GROUP

This group contains six species in the Ethiopian region, one of which is divided into three subspecies. The group extends from Nigeria in the west to Kenya and S. Arabia in the east, and from the highlands of Ethiopia in the north to Cape area in the south. Most of the species are restricted to high mountainous regions, especially those species occurring nearest to the equator. It is of considerable interest that the Ethiopian species of the *seminitida*-group seem very closely related to species of the *Thereva nobilitata*-group, which contains many species in the

Palaearctic and Nearctic regions. The Palaearctic and Nearctic *plebeja*-group also reaches the Ethiopian region in Southern Yemen and Saudi Arabia, as one unnamed species closely related to *bipunctata* Meigen can be recorded from this area.

One of the best characters for the *seminitida*-group (and also for the *nobilitata*- and *plebeja*-groups) is found in the structures ventrally beneath the epandrium. The so-called paraproct is clearly separated in this group and is not fused proximally with a sclerotization of the intersegmental membrane (= ? sternite 10). This sclerotization is entirely divided, forming two flaps which have a sort of articulation with the posterior margin of the epandrium (Text-fig. 411). With a pin these flaps can be folded out independently of each other and of the paraproct. In the other two Ethiopian species-groups of *Thereva*, i.e. the *analis*-group and the *turneri*-group, these lateral flaps are absent, and the paraproct is weakly sclerotized and pigmented and merges imperceptibly into a weakly sclerotized and pigmented intersegmental membrane covering the ventral surface of the epandrium.

The *seminitida*-group is also characterized by the shape of aedeagus, which has a rather long, slender and down-curved phallus and a dorsal apodeme that terminates in a narrow projection distally. The female frons is neither entirely tomentose nor mainly shining blackish, but has one or two strongly marked calli of limited extent, very similar to that found in the *Thereva* of the northern hemisphere.

From a zoogeographical point of view, the species of the *seminitida*-group represent relic elements in the Ethiopian fauna of a basically Holarctic faunal element.

Thereva seminitida Becker

(Text-figs 361, 365, 408–416)

Thereva seminitida Becker, 1909 : 115.

Diagnosis. ♂. A blackish brown species with indistinctly banded abdominal tergites. Proboscis of normal length. Mesonotum with or without *dc* setae and with 1–2 *sa* on each side. Dorsal apodeme of aedeagus (Text-fig. 413) gently down-curved.

♀. Blackish brown with indistinctly banded abdomen. Frons (Text-fig. 361) brownish tomentose, on middle with a more or less distinct, black, transverse callus which is often divided along the mid line.

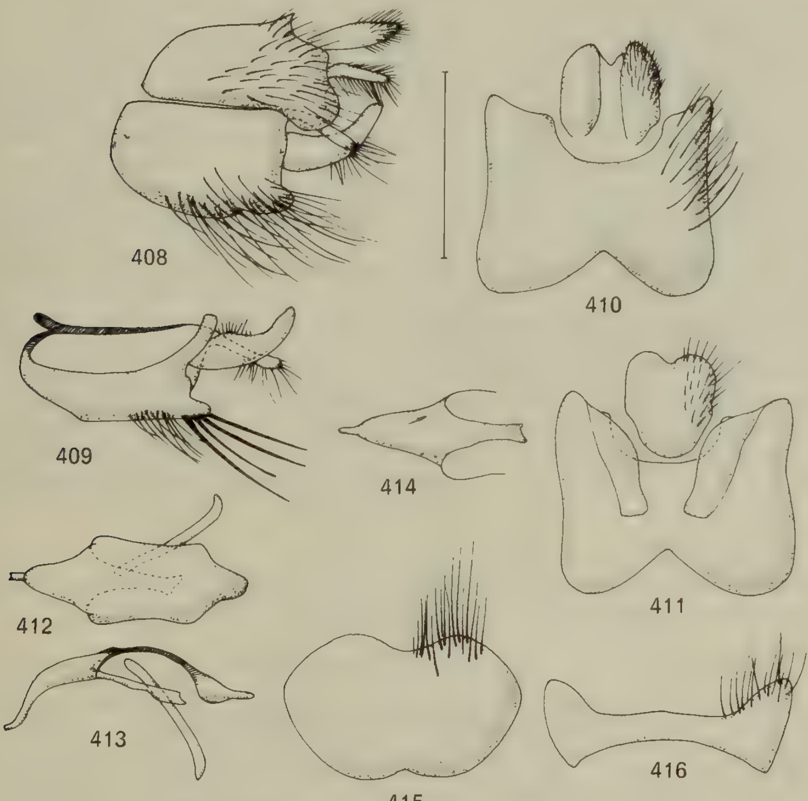
Redescription. ♂. *Head* (Text-fig. 365). Facial index about 1·00. Eyes practically touching for rather a short distance. Upper facets only slightly enlarged. Proboscis almost reaching to level of antennal bases. Palpi distinctly shorter than proboscis, brownish to brownish grey, with predominantly pale hairs but some black hairs at base. Upper corner of frons brownish black and subshining, frons otherwise brownish to greyish brown tomentose, palest on lower part. Face greyish brown to greyish tomentose, darkest laterally. Pile on frons and face almost all black and long, on middle of face with more or less yellowish hairs. Genae and occiput greyish to greyish brown tomentose and with mixed black and pale hairs. Post-ocular setae very long and thin, about 15 on each side; below these with about 10 occipital setae. Antennae rather short, dark brownish to blackish, with thin greyish tomentum on first two segments. Antennal pile long and mostly blackish.

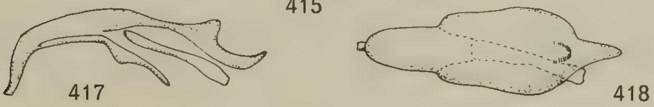
Thorax. Mesonotum pale greyish brown over dull blackish brown to nearly subshining blackish, sometimes striped. Mesonotal pile long and consisting of blackish and yellowish hairs. 1–2 *sa* setae present. *Dc* setae absent or present. Scutellum dark brownish with greyish brown margin, the pile mainly pale. Pleura blackish with rather thin greyish tomentum. Pleural pile yellowish.

Wings. Cell M_4 closed or narrowly open. Vein R_4 beginning with a straight section and terminating in a deep curve or evenly curved. Ground-colour often rather intensely greyish brown to brownish. Cross-veins and fork of R_{4+5} sometimes infuscate. Veins and stigma brownish black. Halteres brownish black.

Legs. F_1 and f_2 without *av* setae, or f_2 with a single *av* seta. F_3 with a row of 6–8 *av* setae on almost the entire length, sometimes biserially arranged basally. T_1 with 2–3 *ad*, *pd* and *pv* setae. T_2 and t_3 with the usual four rows of setae. Femora brownish to blackish, with only thin greyish tomentum. Femoral pile mainly yellowish. Tibiae yellowish brown with slightly darkened tips. Tarsal segments also yellowish brown with darkened tips.

Abdomen. Tergites mainly brownish black and subshining. Tergites 2–3 or 2–4 with the postero-lateral corners gradually becoming more greyish tomentose, but never with any sharply demarcated pattern. Hind-marginal seams yellowish and very distinct on tergites 2–4 (*segmentata*). This yellowish colour may spread out on the extreme lateral margins of the





Figs 408–416. Male terminalia of *Thereva s. seminitida*. 408, genitalia in lateral view; 409, right gonocoxite in intero-ventral view; 410, epandrium in dorsal view; 411, epandrium in ventral view; 412, aedeagus in dorsal view; 413, aedeagus in lateral view; 414, apex of aedeagus in ventral view; 415, sternite 8; 416, tergite 8.

Figs 417, 418. Aedeagus of *Thereva chillaloensis*, holotype. 417, lateral view; 418, dorsal view. Scale: 0·5 mm.

tergites, but in a strict dorsal view the lateral yellowish colour cannot be seen. Sternites reddish yellow to greyish black. Abdominal pile moderately long and yellowish, only darker on the disc of the first tergites.

Terminalia (Text-figs 408–416). Yellowish brown and with yellowish pile. Epandrium (Text-fig. 410) typical for the genus, i.e. short and with two lateral sclerites on underside. Gonocoxite (Text-fig. 408) with an almost truncate posterior margin, with a moderately long projection below. Distal end of dorsal gonocoxal process overhanging posterior margin of epandrium. Stylus (Text-fig. 409) of a featureless shape. Phallus in lateral view (Text-fig. 413) gently down-curved, its tip slightly up-curved. In dorsal view (Text-fig. 412), phallus gradually narrowing towards the very slender tip. Proximal part of dorsal apodeme quite linear in lateral view, i.e. not arched; distal part down-curved. In dorsal view (Text-fig. 412), dorsal apodeme subrectangular proximally, then suddenly narrowing into a rounded tip. Ejaculatory apodeme very slender and long. Tergite 8: Text-fig. 416. Sternite 8: Text-fig. 415.

Total length 7·2–7·9 mm.

♀. *Head* (Text-fig. 361). Facial index about 1·00. Frons mainly brownish tomentose, more greyish brown tomentose below. Middle of frons with a depressed area, and in front of this with a more or less distinct, narrowly transverse, blackish band which reaches from eye-margin to eye-margin but may be divided along middle. Rest of head as in male, but post-ocular setae shorter and fewer in number.

Thorax. Mesonotum mainly coloured as in male, but sometimes with a narrow darker brownish mid line, and sometimes also with the two brownish stripes paler. Mesonotal pile shorter.

Wings and *legs* as in male, but veins often surrounded by more intense dark brownish infuscations.

Abdomen with tergites mainly polished black, with postero-lateral corners of tergites 2–3 to 2–7 greyish tomentose or brownish yellow and untomentose. Distinct hind marginal seams on at least tergites 2–3. Lateral margins of the posterior tergites in particular sometimes distinctly yellowish brown. Sternites distinctly yellowish brown translucent all over, but greyish tomentose on the first sternites. Pile on tergite 4 and the following tergites erect and black, on sternites 2–5 and lateral parts of tergites 2–3 erect and yellowish, and on disc of tergites 2–3 black and adpressed. 7 + 7 terminal spines which are short, slender and rather sharply pointed.

Total length 8·9–9·9 mm.

REMARKS. The species is widespread in the highlands of Africa, and can be divided into three subspecies.

Thereva seminitida seminitida Becker

Thereva seminitida Becker, 1909 : 115; Kröber, 1912 : 406; Kröber, 1929 : 423; Kröber, 1931 : 133. Holotype ♀, KENYA (MP) [examined].

Thereva segmentata Speiser, 1910 : 81; Kröber, 1912: 400; Kröber, 1931 : 132. Holotype ♀, TANZANIA (NRS) [examined]. **Syn. n.**

Thereva striatifrons Kröber, 1913 : 263, Kröber, 1931 : 132; Kröber, 1939 : 395. Holotype ♀, TANZANIA (MB, lost). **Syn. n.**

DIAGNOSIS AND DESCRIPTION. ♂. Mesonotum almost uniformly dull blackish brown, only laterally more greyish brown tomentose. Only 1 *sa* seta present, and *dc* seta absent. Wing with vein R_4 beginning straight and terminating in a deep curve. Cross-veins and fork of R_{4+5} slightly infuscated. Setae of f_3 uniserially arranged. Sternites very pale, nearly all reddish yellow, only slightly greyish on lateral parts of first sternites.

♀. Blackish frontal band more distinct than in the following two subspecies. Only tergites 2–3 or 2–4 with greyish tomentose postero-lateral corners.

DISTRIBUTION. The subspecies seems restricted to the highlands of Kenya and Tanzania. It is recorded from 'montane forest', 'Podocarpus-bamboo zone' and 'prairie subalpine'.

MATERIAL EXAMINED.

Holotype ♀ of *seminitida*, KENYA: Escarpment, ix. 1906 (*Maurice de Rothschild*) (MP). Holotype ♀ of *segmentata*, TANZANIA: Kilimanjaro, 1905–06 (*Sjöstedt*) (NRS); the holotype has lost the left wing and parts of the legs, and the mesonotum is rubbed bare, but the specimen can be easily identified as conspecific with *seminitida*.

KENYA: Chyulu Hill, 1675–1825 m, 4 ♂, 2 ♀, v–vii. 1938 (*Coryndon Museum Exp.*) (BMNH & ZMC); Naivasha, 1 ♂, 2 ♀, vii. 1937 & vii. 1940 (*H. J. Turner*) (BMNH); Athi, 1 ♂, vi. 1941 (*van Someren*) (BMNH); Nairobi, 1 ♂, vii.1937 (*van Someren*) (BMNH); Mt Kenya, W. side, 2440 m, 1 ♂, 26.xii.1969 (*M. E. Irwin & E. S. Ross*) (MEI); 22 km NE. Nakuru, montane forest, 2300 m, 1 ♀, 26. xii. 1969 (*M. E. Irwin & E. S. Ross*) (MEI); Karen, 1770 m, 1 ♀, 21.xii.1969 (*M. E. Irwin & E. S. Ross*) (MEI); Ngong Hills, 1 ♀, ii. 1940 (*van Someren*) (BMNH); Meru, 1 ♀, vii. 1943 (*van Someren*) (BMNH); Ngong, 1 ♀, x. 1943 (*van Someren*) (BMNH); Rift Escarpment, Nakuru Road, 1 ♀, 21.i.1968 (*J. W. Boyes*) (BMNH). TANZANIA: Mt Meru, Olkokola, versant NO, 2500–2600 m, 1 ♂, 2 ♀, 3–8.vii.1957 (*P. Basilewsky & N. Leleup*) (MCT); Mt Meru, Momella, 1 ♀, 10–19.ii.1964 (*W. Forster*) (ZSM); Mt Meru, 1800 m, 1 ♀, 21.vi.1962 (CNC); Kilimanjaro, Moshi-Marangu, 1 ♂, 30.viii.1894 (*Kretschmer*) (ZMB); Shira Plateau, Kilimanjaro, 1 ♀, 4.vii.1970 (*Studenterrådets studierejse*) (ZMC); Mt Hanang, vers. Sud, 2900–3200 m, subalpine meadow, 1 ♀, 23.v.1957 (*P. Basilewsky & Leleup*) (MCT); Paré Mt, 1 ♀, 30.v.1963 (*G. Heinrich*) (CNC); Darma, 1 ♀, xii. 1905 (*Dr Schröder S.G.*) (ZMB).

Thereva seminitida occidentalis subsp. n.

[*Psilocephala chapini* Curran sensu Vanschuytbroeck, 1950 : 21. Misidentification.]

DIAGNOSIS AND DESCRIPTION. ♂. The description of the nominate subspecies, *seminitida seminitida*, also fits subsp. *occidentalis* in all details, except for three characters: *dc* setae present, 2 *sa* setae on each side, and *av* setae of f_3 biserial in basal half.

♀. With the same differences in thoracic chaetotaxy as given above for the male. In addition, frons slightly narrower in subsp. *occidentalis* than in subsp. *seminitida*, and frontal transverse band less distinct (as in subsp. *stuckenbergi*). Mesonotum paler greyish brown and with paler stripes, and tergites 2–7 distinctly greyish tomentose along posterior margin. Wings almost uniformly greyish brown, without distinct infuscations.

REMARKS. The holotype and the two paratypes listed from Zaire were all identified by P. Vanschuytbroeck in 1950 as *Psilocephala chapini* Curran, and this incorrect identification was published by Vanschuytbroeck (1950 : 21). The female paratype from Ruanda in the Berlin Museum was labelled 'Thereva ruandana Grünberg/Type'. However, no description has ever been published, and the name is a MS name.

DISTRIBUTION. Recorded from mountainous regions in Nigeria in the west, through Zaire (Belgian Congo) to Ruanda and Uganda in the east. All recorded altitudes are over 1700 m.

MATERIAL EXAMINED.

Holotype ♀, ZAIRE ('Congo belge'): P.N.A., Nyarusambo (Kikere), 2226 m, 28–29.vi.1934 (*G. F. de Witte*) (IPNB).

Paratypes. ZAIRE ('Congo belge'): vers. Rweru, volc. Mikeno (Bambous), 2400 m, 1 ♀, 3.vii.1934 (*G. F. de Witte*) (PNB); Kivu, Ando, 1 ♂, 20.vii.1935 (*Dr H. Damas*) Park. Nat. Albert (PNB). RWANDA: Karissimbi, Südfuss, 2700 m, 1 ♀, 4.viii.1911 (*H. Mayer S.G.*) (ZMB). UGANDA: Ruwenzori Range, Namwamba Valley, 1970 m, 1 ♀, xii. 1934–i. 1935 (*F. W. Edwards*) B.M.E. Afr. Exp. (BMNH). NIGERIA: Mambilla Plateau, Ngel Nyaki, montane forest ca 1700 m, 1 ♀, 28.xi–3.xii.1968 (*J. C. Deeming*) (BMNH).

***Thereva seminitida stuckenbergi* subsp. n.**

DIAGNOSIS AND DESCRIPTION. ♂. Stronger and more broadly built than the nominate subspecies from Kenya and Tanzania. Upper facets slightly more enlarged. 2 *sa* setae, and *dc* setae also present (as in *seminitida occidentalis*). Mesonotum with a darker (almost blackish) and more shining appearance. Vein R_4 more gently curved. Basal and anterior parts of wing strongly brownish infuscate with dark brownish streaks, and also some of the veins, especially those surrounding discal cell. The one f_2 has an *av* seta. Chaetotaxy and colour of legs otherwise as in the nominate subspecies, but tibiae and tarsi darker at tips. Tergites blackish, with only small grey tomentose areas at lateral corners of tergites 2–3. Lateral parts of tergites not yellowish brown translucent as in *s. seminitida*, and sternites entirely greyish black. Terminalia hardly distinguishable from those of the nominate subspecies; aedeagus perhaps slightly more strongly curved in lateral view. Both epandrium and gonocoxites brownish black with blackish hairs. Total length about 9 mm.

♀. Frons with the same dark brownish grey tomentum, and with a narrow, vaguely delimited blackish band on middle as in the nominate subspecies, but antennae shorter and proboscis and palpi also shorter. Mesonotum as in male with 2 *sa* and 1 *dc* setae. Femora not always entirely black, but more or less brownish in some specimens, especially on ventral surface. Tergites entirely blackish brown to black and shining, as in *s. seminitida*, lateral corners of tergites 2–4 paler brownish yellow, but not at all tomentose. Total length about 10 mm.

DISTRIBUTION. Known only from the mountainous districts of Lesotho and the Natal province of South Africa. There is a wide gap in distribution between *seminitida stuckenbergi* and the nominate subspecies, which occurs in Kenya and Tanzania. The third subspecies, *seminitida occidentalis*, extends from Uganda and Ruanda through Zaire to Nigeria.

MATERIAL EXAMINED.

Holotype ♂, LESOTHO: Makkapung Dip., 2440 m, 23.i.1955 (*L. Bevis*) (NM).

Paratypes. SOUTH AFRICA: Natal, Kranskop, 2830 m, 2 ♀, xi. 1964 (*B. Stuckenberg*) (NM & ZMC); Natal, Drakensberg, Giants Castle Res., 1770 m, 1 ♀, 18–23.ix.1961 (*B. & P. Stuckenberg*) (NM); Natal, Royal National Park, Drakensberg Mts, 1500 m, on stones in river bed, 1 ♀, 12.ix.1963 (*B. & P. Stuckenberg*) (NM).

***Thereva chillaloensis* sp. n.**

(Text-figs 362, 366, 417, 418)

DIAGNOSIS. ♂. Extremely difficult to separate from *s. seminitida* in the afro-alpine areas of Kenya and Tanzania. Colour differences are given in the key, but they may not be constant. The aedeagus of *chillaloensis* (Text-fig. 417) has a remarkable tubercle on the dorsal apodeme. *T. tuberculifrons*, also found in Ethiopia, has an aedeagus of rather similar appearance (Text-fig. 423), but possesses *dc* setae and has a more greyish tomentose abdomen.

♀. Easily recognized in the group by possessing two conspicuous, ovoid, shining black frontal calli (see Tex-fig. 362). Otherwise very similar to the female of *s. seminitida*.

DESCRIPTION. ♂. *Head* (Text-fig. 366). Facial index about 1·17. Eyes touching for a short distance. Proboscis rather short and not reaching to level of antennal bases. Palpi shorter than proboscis, dark greyish and with whitish hairs. Upper frons blackish, lower frons dark greyish tomentose. Rest of head whitish grey tomentose. Pile on frons long and black. Black hairs present on upper lateral part of face; rest of face with whitish pile, as on genae and occiput. Post-ocular setae long and very thin, about 25 on each side. A few hair-like occipital setae. Antennae blackish, greyish tomentose on first two segments. Pile on first segment moderately long and consisting of both whitish and black hairs.

Thorax. Mesonotum rather pale, brownish grey with two narrow indistinct paler stripes and a dark brownish mid line. Pile long and consisting of black and pale yellowish hairs. 1 *sa* on each side. *Dc* setae absent. Scutellum greyish brown with pale hairs. Pleura greyish with pale hairs.

Wings. Cell M_3 open in holotype, short-petiolate in paratype. Vein R_4 gently S-curved. Colour greyish hyaline with a brownish tinge. Infuscate areas, if present, at most very indistinct. Stigma indistinct. Veins and halteres blackish brown.

Legs. Front legs lost. F_2 without *av* setae. F_3 with a row of 4–6 rather long *av* setae. Femora blackish brown with thin greyish tomentum and pale hairs. Tibiae and metatarsi yellowish brown. Rest of tarsi blackish brown.

Abdomen. Seen from above, tergites blackish brown and shining, with narrow brownish hind marginal seams and extreme postero-lateral corners greyish tomentose. Seen from the side, the lateral areas of all tergites greyish tomentose. Sternites greyish tomentose and with broad, brownish yellow hind-marginal seams. Pile long and whitish on sternites and lateral parts of tergites, shorter and blackish on disc of tergites.

Terminalia (Text-figs 417, 418). Epandrium and gonocoxites brownish black. Epandrium with mainly black hairs, the gonocoxites with yellowish hairs. Structure of epandrium and gonocoxites in external view as in *tuberculifrons* (Text-figs 419–421). Epandrium, tergite 8 and sternite 8 also as figured for *tuberculifrons*. Aedeagus (Text-figs 417, 418) similar to the aedeagus of *tuberculifrons*, but phallic part shorter and more strongly curved, and dorsal apodeme with a remarkable tubercle.

Total length 8·3 mm.

♀. *Head* (Text-fig. 362). Facial index about 1·02 . Frontal stripe with two well-separated frontal calli which are ovoid and moderately arched. Rest of frons brownish grey tomentose. Other parts of head as in male, but only about 6–8 short post-ocular setae.

Thorax. Mesonotum more distinctly striped. The pattern formed by three brownish grey or greyish black bands separated by paler yellowish grey stripes which are broadly confluent on posterior third of mesonotum. Along the mid-line with a narrow dark brownish line which is most distinct posteriorly and continues on to scutellum. 1 pair of *dc* setae usually present.

Wings and *legs* as in male, but f_1 and/or f_2 may have one or two small *av* setae, or these are absent as in the male.

Abdomen in dorsal view with same pattern as in the male. Sternites variable in colour, in some specimens extensively yellowish brown and only greyish anteriorly on the first two sternites, in other specimens intensely greyish all over. 7 + 7 terminal spines which are rather short and blunt-tipped.

Total length 8·6–9·2 mm.

Distribution. Probably restricted to the high mountainous regions of Ethiopia.

Material examined.

Holotype ♂, Ethiopia: 'Abyssinia', Digalla, Mount Chillálo, ca 2900 m, 26.xi.1926 (*Dr H. Scott*) (BMNH).

Paratypes. Ethiopia: same data as holotype, 1 ♂, 3 ♀ (BMNH & ZMC); Abyssinia, Wolamo Prov., Mt Damota, over 3000 m, from grassy slopes on summit and near spring, 1 ♀, 5.xi.1948 (*Hugh Scott*) (BMNH).

Thereva tuberculifrons Kröber

(Text-figs 363, 367, 419–425)

Thereva tuberculifrons Kröber, 1913 : 264; Kröber, 1931 : 130. LECTOTYPE ♂, Ethiopia (USNM), here designated [examined].

Diagnosis. ♂. Proboscis of normal length, though hardly reaching to antennal bases. *Dc* setae present, and 1 *sa* seta on each side. All tergites greyish tomentose on posterior parts, but not forming very distinct bands. Posterior tergites mainly greyish tomentose, though rather dark. Aedeagus (Text-fig. 423) with a tubercle on dorsal apodeme, but not as clearly set-off as in *chillaloensis* (Text-fig. 417).

♀. Frons (Text-fig. 363) with a shining black callus formed by two strongly protruding areas which are broadly connected. Tergites entirely black.

Redescription. ♂. *Head* (Text-fig. 367). Facial index about 1·00. Eyes practically touching for a short distance. Upper facets slightly enlarged. Proboscis not reaching to level of antennal bases. Palpi distinctly shorter than proboscis, greyish brown and with pale hairs. Upper parts of frons blackish brown, lower part brownish grey tomentose, becoming paler greyish below. Face, genae and occiput whitish grey tomentose. Pile on frons and lateral parts of face long and black, on middle of face with dirty whitish yellow hairs. Genae and occiput with whitish yellow hairs, but with black hairs intermixed on genae and lower occiput. Post-ocular setae long, thin and numerous, about 20 on each side. Only a few occipital setae. Antennae brownish black to black, palest at base of segment 3. First two segments with greyish tomentum, and pile on first segment moderately long and consisting of both black and pale hairs.

Thorax. Mesonotum dark brownish, with two indistinct paler greyish brown stripes, and lateral parts also greyish brown. Mesonotal pile long and consisting of black and yellow hairs. Only 1 *sa* seta on each side. 1 pair of *dc* setae. Scutellum dark brownish with yellowish hairs. Pleura thinly greyish tomentose and with pale hairs.

Wings. Cell M_3 closed and short-petiolate. Vein R_4 gently S-curved. Practically uniformly greyish brown in colour, without distinct infuscations; veins dark brownish. Halteres blackish.

Legs. F_1 and f_2 without *av* setae. F_3 with 5–6 strong *av* setae along the entire length. Tibiae with chaetotaxy as in *seminitida*. Femora black, with slight grey tomentum and mainly pale hairs. Tibiae brownish, tips darkened. Tarsi blackish except for most of metatarsi which are brownish.

Abdomen. Tergites brownish black and shining on anterior part, more greyish on posterior part, but not distinctly banded. Hind marginal seams dirty yellowish. Extreme lateral margin of basal tergites and all of sternites yellowish brown, but sternites sometimes greyish tomentose. Tergal pile long and predominantly whitish yellow laterally, but disc of the broad tergites with short, black, adpressed hairs. Sternal pile whitish yellow.

Terminalia (Text-figs 419–425). Epandrium and gonocoxites brownish to blackish with grey tomentum. Pile consisting of black and pale hairs. Epandrium (Text-fig. 421) typical for the genus. Gonocoxite (Text-fig. 419) with a moderately long projection below. Distal end of dorsal gonocoxal process overhanging posterior margin of epandrium and characteristically truncate apically. Stylus (Text-fig. 420) rather short and broad. Ventral lobe (Text-fig. 420) long and spoon-shaped. Phallus in lateral view (Text-fig. 423) long, slender and gradually curved; in dorsal view (Text-fig. 422) rather broad proximally, then becoming suddenly narrower. Dorsal apodeme (Text-fig. 423) truncate apically and with a short 'tail'; in dorsal view (Text-fig. 422) broadly ovate. Tergite 8: Text-fig. 424. Sternite 8: Text-fig. 425.

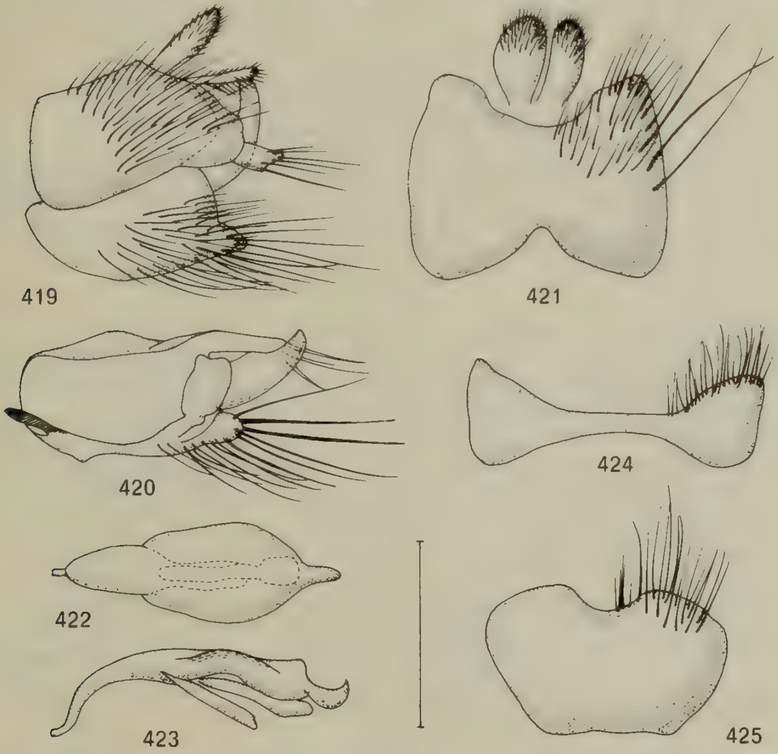
Total length 7·4–8·6 mm.

♀. *Head* (Text-fig. 363). Facial index about 1·05. Frons with a large shining black callus. This is formed by two strongly protruding circular areas which are broadly connected. Area above frontal callus dark brownish tomentose. Lower frons brownish grey tomentose. Other parts of head with colour and hairs as in male. Post-ocular setae fewer and shorter than in male. Antennae as in male.

Thorax, *wings* and *legs* as in male, but mesonotal pile shorter and scutellum paler.

Abdomen with all tergites entirely black and shining, with narrow yellowish hind-marginal seams on tergites 2–4. Anterior parts of sternites 2–5 brownish black, but posterior parts yellowish brown. Posterior sternites entirely yellowish brown.

Total length 10·6 mm.



FIGS 419–425. Male terminalia of *Thereva tuberculifrons*, lectotype. 419, genitalia in lateral view; 420, right gonocoxite in intero-ventral view; 421, epandrium in dorsal view; 422, aedeagus in dorsal view; 423, aedeagus in lateral view; 424, tergite 8; 425, sternite 8. Scale: 0·5 mm.

REMARKS. Kröber (1913 : 264) described *Thereva tuberculifrons* from a series of specimens from 'Abessinien, Wagira, Gara-Mutata Berge' and stated that the types (♂ and ♀) were in his own collection. As this has been destroyed, it seems justifiable to designate as lectotype an apparently syntypic male specimen labelled as 'cotype' 'Abessinia, Wagira' and 'Thereva tuberculifrons Kröb. det.', located in the U.S. National Museum. Two further syntypes, a male and a female, with the same labels as the lectotype, but with 'Type' instead of 'Cotype', are located in the Paris Museum. They have been labelled by me as paralectotypes. The lectotype is slightly crushed and has lost the left hind leg, but the colour is well preserved.

DISTRIBUTION. Only known from the high mountains of northern Ethiopia.

MATERIAL EXAMINED.

Lectotype ♂, ETHIOPIA: 'Abessinia', Wagira, *Thereva tuberculifrons* Kröb. det. (USNM, cotype No.24230). Paralectotypes, ETHIOPIA: same data as lectotype, 1 ♂, 1 ♀ (MP).

ETHIOPIA: Simien, Lori, ca 3500 m, 1 ♂, 27.xi.1952 (*Hugh Scott*) (BMNH).

Thereva natalensis sp. n.

(Text-figs 368, 426–432)

DIAGNOSIS. ♂. This and the following species, *capensis*, can be distinguished from other species of the *seminitida*-group by the short proboscis. *T. natalensis* is a smaller species, less than 7 mm in total length, with only 6–8 post-ocular setae, and has the mesonotum and most of the tergites brownish black, while lateral parts of the tergites and all the sternites are yellowish brown.

♀. Unknown.

DESCRIPTION. ♂. *Head* (Text-fig. 368). Facial index about 0·95. Eyes practically touching for rather a long distance in front of anterior ocellus. Upper facets enlarged. Proboscis short. Palpi as long as proboscis, greyish brown and with both pale and black hairs. Narrow triangle on upper frons dull brownish black. Rest of frons brownish grey tomentose above, becoming gradually more greyish white tomentose below. Frons with long black pile down to level of antennae. Face whitish grey tomentose and with exclusively whitish pile. Gena with a tuft of black hairs. Occiput whitish grey tomentose, but narrowly brownish on upper post-ocular margin. Post-ocular setae short and slender, only about 6–8 on each side. Only a few short and slender occipital setae. Occiput otherwise with whitish pile. Antenna short, brownish to brownish black, and with thin greyish tomentum on first two segments. Pile on first segment comparatively short and consisting of both blackish and whitish hairs.

Thorax. Mesonotum with three broad, conspicuous, brownish black bands, which are separated by two narrow paler brownish stripes, and also with posterior and lateral areas paler brownish to brownish grey. Pile moderately long and consisting of black and whitish yellow hairs. Scutellum brownish black. 2 *sa* setae on each side, 1 pair of *dc* setae present. Pleura greyish, with whitish pile.

Wings. Cell M_3 closed at wing-margin. Vein R_4 gently S-curved. Ground-colour rather intensely brownish, veins brownish black and surrounded by dark brownish shadows. Halteres brownish black.

Legs. F_1 and f_2 without *av* setae. F_3 with 6–8 *av* setae which are longer than usual in the genus and tend to be rather irregularly arranged; also with a few *pv* setae near apex. T_1

with 3–5 *ad*, *pd* and *pv* setae. T_2 and t_3 with rows of strong setae in all four positions; *pv* setae of t_3 also well-developed, and *ad* and *pd* setae of t_3 numerous. Femora brownish to almost blackish brown, with predominantly black adpressed hairs, at least on anterior apical surfaces. Tibiae and tarsi brownish to dark brownish.

Abdomen. In dorsal view tergites 2–4 with distinct whitish yellow hind-marginal seams. All tergites mostly brownish black and subshining, but the postero-lateral corners gradually becoming more greyish to greyish brown on tergites 2–3. Extreme lateral margin yellowish brown translucent, but this yellowish brown colour practically invisible in a strictly dorsal view. Sternites entirely yellowish brown. Pile moderately long and whitish yellow, only blackish on anterior dark areas of first tergites.

Terminalia (Text-figs 426–432). Yellowish brown, and with only pale hairs. Epandrium (Text-fig. 428) rather short. Gonocoxite (Text-fig. 426) broadly truncate posteriorly, with a short projection below. Distal end of dorsal gonocoxal process overhanging posterior margin of epandrium. Stylus comparatively short and stout. Phallic part of aedeagus (Text-fig. 429) rather gradually down-curved; in dorsal view (Text-fig. 430) gradually decreasing in width towards tip. Dorsal apodeme in dorsal view (Text-fig. 430) broad proximally, then narrowing rapidly into a slender distal projection. Tergite 8: Text-fig. 431. Sternite 8: Text-fig. 432.

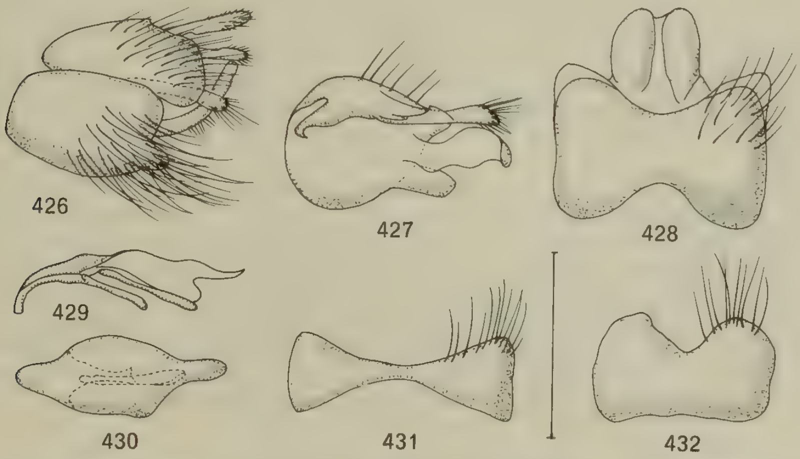
Total length 6·5–6·7 mm.

♀. Unknown.

MATERIAL EXAMINED.

Holotype ♂, SOUTH AFRICA: Natal, Karkloof, 4.ix.1960 (*B. & P. Stuckenberg*) (NM).

Paratypes. SOUTH AFRICA: same data as holotype, 3 ♂ (*B. & P. Stuckenberg*) (NM & ZMC); Natal, Drakensberg, 1780 m, Giants Castle Res., 1 ♂, 18–23.ix.1961 (*B. & P. Stuckenberg*) (NM); Natal, Pietermaritzburg Dist., Swartkop Location, 1 ♂, vii. 1959 (*B. & P. Stuckenberg*) (NM).



FIGS 426–432. Male terminalia of *Thereva natalensis*, holotype. 426, genitalia in lateral view; 427, right gonocoxite in interior view; 428, epandrium in dorsal view; 429, aedeagus in lateral view; 430, aedeagus in dorsal view; 431, tergite 8; 432, sternite 8. Scale: 0·5 mm.

***Thereva capensis* sp. n.**

(Text-figs 367, 369. 433–439)

DIAGNOSIS. ♂. With a short proboscis, as in *natalensis*. A larger species, more than 9 mm in total length, with at least 12 long and thin post-ocular setae.

♀. The very large polished black frontal callus, reaching to top of vertex (Text-fig. 364), separates this species from all other African species of *Thereva*.

DESCRIPTION. ♂. *Head* (Text-fig. 369). Facial index 1·00. Eyes practically touching for a short distance. Upper facets enlarged. Proboscis short and slender; its length equal to only half the distance from antennal bases to base of proboscis. Palpi slightly shorter than proboscis, slender, greyish yellow and with whitish yellow pile. A rather large area on upper frons blackish, rest of frons and other parts of head greyish yellow to whitish grey tomentose. Frons and face with long black pile, with many whitish yellow hairs intermixed on lower face. Genae with a group of black hairs. Occiput entirely covered with whitish yellow pile; post-ocular black setae long and thin, at least 12 setae present on each side. Antenna slender. First, second and base of third segment brownish to brownish black, first segment with pale greyish tomentum. Rest of third segment and style blackish.

Thorax. Mesonotum brownish black and subshining, with two narrow and very indistinctly paler stripes, and lateral areas also paler greyish. Scutellum brownish black. Mesonotal pile consisting of long, erect, black hairs and shorter and more adpressed, yellowish hairs. Scutellar pile wholly yellowish. Pleura pale greyish with whitish yellow pile. 2 *sa* and 1–2 *dc* setae present.

Wings. Cell M_3 closed. Vein R_4 gently curved along its entire length. Ground-colour brownish grey, stigma and veins brownish black. Cross-veins and fork of R_{4+5} with distinct brownish infuscations.

Legs. F_1 without *av* setae. F_2 with 1–3 *av* setae. F_3 with a row of up to 8 *av* setae along entire length. T_1 with 3–4 strong *ad*, *pd* and *pv* setae. T_2 and t_3 with rows of setae in all four positions, but *pv* setae of t_3 short. Femora blackish grey and with mainly whitish pile. Tibiae brownish, only indistinctly darkened apically. Tarsi mainly brownish black, but more brownish basally on basal segments.

Abdomen. Tergites 2–5 with broad, blackish anterior bands which are sub-shining and occupy at least three-quarters of total tergal length along the mid line, but do not reach actual margins of tergites, thus strongly narrowed laterally. All tergites with rather broad, pale yellowish hind marginal seams. Postero-lateral corners of all tergites clearly yellowish brown translucent, these yellowish brown areas visible in dorsal view. Sternites entirely yellowish brown, but slightly darkened by greyish tomentum, especially on lateral parts of anterior sternites. Abdominal pile moderately long and whitish yellow, only blackish on the blackish tergal bands.

Terminalia (Text-figs 433–439). Yellowish brown, epandrium with long black pile, gonocoxite with long pile consisting of mixed black and pale hairs. Epandrium (Text-fig. 434) as typical for the genus. Gonocoxite (Text-fig. 433) with a finger-like projection on posterior margin. Dorsal gonocoxal process overhanging posterior margin of epandrium. Stylus (Text-fig. 435) comparatively short and stout. Phallic part of aedeagus in lateral view (Text-fig. 436) slender and gently down-curved, the actual tip up-curved. In dorsal view (Text-fig. 437) proximal part of phallus half as broad as dorsal apodeme, then gradually decreasing in width towards the very narrow tip. Dorsal apodeme (Text-fig. 436) down-curved distally, in dorsal view (Text-fig. 437) with distal margin pointed. Tergite 8: Text-fig. 438. Sternite 8: Text-fig. 439.

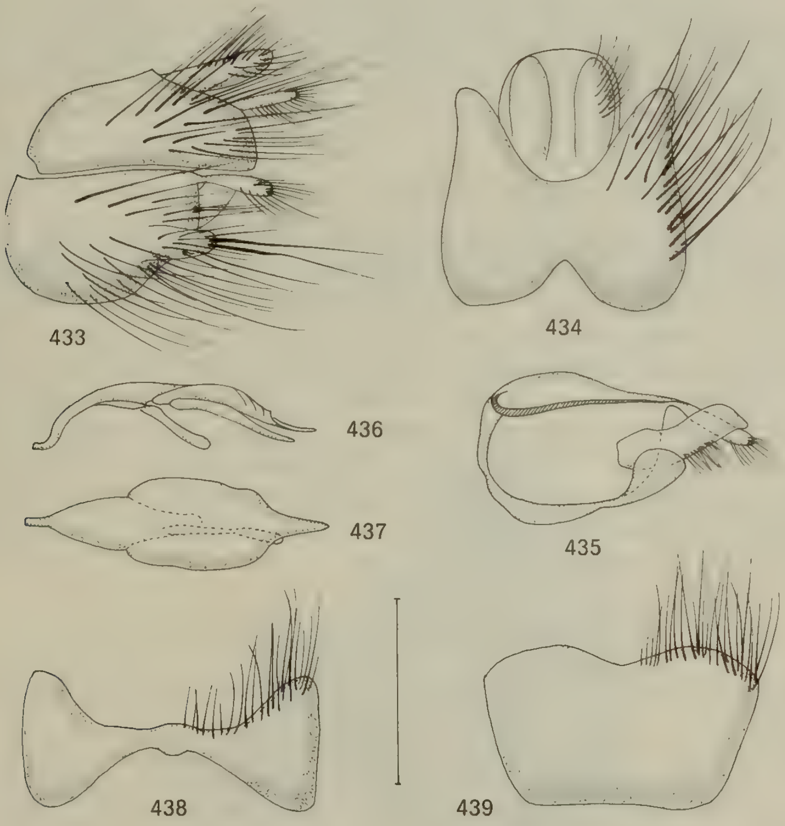
Total length 9·0–10·7 mm.

♀. *Head* (Text-fig. 364). Facial index about 1·13. Frons with a large, polished black callus which reaches to vertex and thus covers the areas laterad of the ocellar callus as well. Callus separated from ocular margin by brownish tomentose stripes of varying widths; its anterior margin almost straight, with a sharply pointed incision. Anterior part of frons pale brownish grey tomentose. Rest of head whitish grey tomentose, upper part of occiput with a brownish tinge. Middle of face with two narrow polished black stripes which may be almost confluent in some specimens. Lower frons with rather short black pile. Rest of head with whitish pile, but genae with a group of black hairs. 5–8 rather short post-ocular setae on each side and a larger number of occipital setae. Otherwise as in male.

Thorax. Mesonotum with distinct stripes. Pattern consisting of a brownish black median band, which is separated from the two lateral brownish black bands by rather broad, brownish grey stripes. Anterior and lateral parts of mesonotum also greyish brown to pure greyish. Mesonotal pile moderately long and consisting of erect black hairs and adpressed pale hairs. Scutellum mainly greyish brown, blackish brown only on a central area. Pleura and chaetotaxy as in male.

Wings as in male, but cell M_3 sometimes narrowly open.

Legs. Chaetotaxy as in male, but f_1 sometimes with a single *av* seta. Femora differently coloured from male: their colour not constant, sometimes almost entirely brown, but usually more or less irregularly darkened, especially apically and dorsally. Tibiae and tarsi as in male.



FIGS 433–439. Male terminalia of *Thereva capensis*, holotype. 433, genitalia in lateral view; 434, epandrium in dorsal view; 435, right gonocoxite in intero-ventral view, hairs omitted; 436, aedeagus in lateral view; 437, aedeagus in dorsal view; 438, tergite 8; 439, sternite 8. Scale: 0·5 mm.

Abdomen. Main pattern as in male, i.e. with large blackish anterior bands on tergites 2–6. Between these bands and the yellowish hind marginal seams with a stripe of pale greyish tomentum, which does not cover the distinct yellowish brown colour on postero-lateral corners of tergites. Unlike in the male, this yellowish brown colour can also be seen in strictly dorsal view. Tergites 7–8 brownish and shining. Abdominal pile short, consisting of adpressed black hairs on discs of tergites 2–5, of erect whitish hairs laterally on tergites 1–3 and of erect black hairs on posterior tergites. 7 + 7 terminal spines which are rather long, broad and blunt-tipped.

Total length 9·8–11·4 mm.

DISTRIBUTION. Apparently restricted to the Cape Province of South Africa and obviously a strictly coastal species there.

MATERIAL EXAMINED.

Holotype ♂, SOUTH AFRICA: Cape Prov., Mossel Bay, 15–28.iii.1922 (*R. E. Turner*) (BMNH).

Paratypes. SOUTH AFRICA: same locality as holotype, 1 ♂, 1 ♀, 1–13.iii.1922; 1 ♂, 1 ♀, 15–28.iii.1922; 1 ♂, 1 ♀, iv. 1921 (*R. E. Turner*) (BMNH & ZMC); Cape Prov., Cape Peninsula, Hout Bay, Skoorsteenskop, 3 ♂, 21 ♀, 21.i–18.ii.1951 (*Brinck & Rudebeck*) (ZIL, ZMC & MEI); Cape Prov., Plettenberg Bay, 3 ♀, 14.iii.1968 (*Paul J. Spangler*) (USNM & ZMC); Cape Prov., Cape Good Hope Nature Reserve, 3 ♀, 7–10.iii.1968 (*Paul J. Spangler*) (USNM & ZMC).

Thereva sp. near ***bipunctata*** Meigen, 1820

A male labelled 'W. Aden Prot., Jebel Yihaf, in cultivated fields, ca 7100 ft, ix. 1937 (*H. Scott & E. B. Britten*)' (BMNH) and a female labelled 'S. Arabia, Mukeiras, 7200 ft, 16.v.1967 (*K. M. Guichard*)' (CJG) belong to a species which is not represented in material from the African part of the Ethiopian region. This species is closely related to *bipunctata* Meigen. Both sexes are characterized by the presence of *pv* setae at the base of f_3 and in the female sex by two separated, rounded, shining black frontal calli. The *bipunctata*-subgroup contains a number of species in the Mediterranean subregion, which are only imperfectly known. It is probably one of these Mediterranean species which penetrates south to Southern Yemen and Saudi Arabia, but its status would be better resolved within the framework of a revision of the Mediterranean fauna.

CAENOPHTHALMUS Kröber

Caenophthalmus Kröber, 1931 : 128. Type-species: *Caenophthalmus bellus* Kröber, 1931, by monotypy.

DESCRIPTION. *Head.* Male eyes touching or practically touching for a shorter or longer distance. Eye facets of equal size. Face relatively wide, facial indices between 0·90 and 0·97, i.e. distance between lower eye-margins 90–97 per cent of height of head. Frons and face in both sexes with a long pile. On genae a tuft of black hairs, and also occiput with long pile. Female frons very wide, partly due to a strong reduction of the eyes (Text-fig. 440). Female frons without calli, but upper part often of a darker colouration due to brownish tomentum. Post-ocular setae in male numerous, long and thin; in female few and short. Occipital setae usually absent in the male, whilst a few occipital setae may be present in the female. Proboscis shorter or longer, rather narrow and with comparatively small labellae. Palpi vermiform, about half as long as proboscis, yellowish and with a long whitish pile. Antennae (Text-fig. 440) very uniform in shape, first segment being slightly incrassate, while segment 3 has a distinct constriction basally. The antennae thus appear 4-segmented exclusive of the style, and this appearance is strengthened by the fact that the basal section of segment 3 is coloured as segment 1 and 2 and strongly contrasts to the black apical section. Style with two sections, the two sections being of varying length; apically a slender spine.

Thorax. Mesonotum with 3 notopleural, 1–2 supraalar and 1 postalar setae. 0–2 dorsocentral setae. Scutellum with 2–4 setae; additional lateral setae may be present. Prosternum with long hairs on whole surface. Sternopleuron with long hairs on most of its surface.

Wings. Cell M_3 usually short petiolate. Cell R_4 relatively wide towards apex, about twice as long as wide between tips of veins R_4 and R_5. Wings often spotted by areas of dark microtrichia. A very distinct stigma is present.

Legs. Cx_1 and cx_2 with long hairs on both anterior and posterior surfaces. F_1 without setae. F_2 with 1 anteroventral seta and sometimes 1 anterodorsal seta near apex. F_3 with several anteroventral setae, and a few anterodorsal and posteroventral setae at apex. T_1 with rows of anterodorsal, posterodorsal and posteroventral setae. T_2 and t_3 with rows of setae in all four positions. Femoral pile usually long and dense. Tibial pile also long and dense, usually as long as the setae, and tibiae may be slightly incrassate.

Abdomen. The shape is as in a typial *Thereva*, i.e. more or less conical, and bearing a long pile in the males, whereas the female abdomen is shorter haired. Tergites nearly totally black or at least with distinct blackish anterior bands. These are usually widest laterad of mid line, a character distinct from *Thereva*.

Male terminalia. Epandrium, as in *Thereva*, always broader than long in mid line. Cerci normal but long. Paraproct continuing into a comparatively well sclerotized intersegmental membrane (cf. the *Thereva turneri*-group). Gonocoxite with a pointed projection posteriorly. Distal end of dorsal gonocoxal process long, overhanging posterior margins of both epandrium and gonocoxite. Stylus and ventral lobe well developed. Hypandrium present as a free narrow sclerite between the ventral part of gonocoxites. Aedeagus simple, phallic part comparatively long, narrow and straightly down-curved. Dorsal apodeme distinctly incurved distally.

REMARKS. The genus *Caenophthalmus* is represented by five species in the Cape

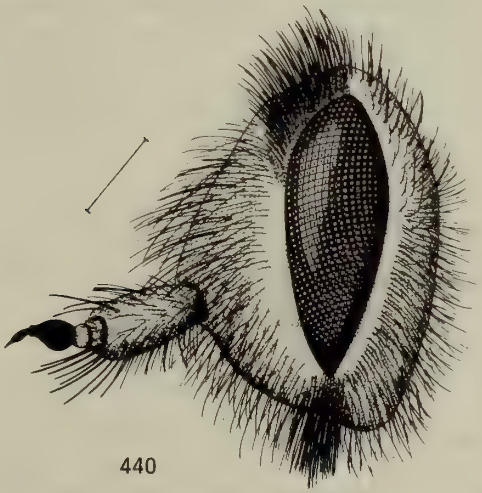


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FIG. 440. *Caenophthalmus bellus*, head in lateral view of ♀ holotype. Scale: 0·5 mm.

Province, South Africa, and it is probably restricted to that area. The species seem to be associated with both inland and coastal dune systems.

The genus is clearly monophyletic, the best apomorphic character being the partial reduction of the eyes in the female (Text-fig. 440). Another apomorphic character is the secondary false segmentation of the third antennal segment. Similar conditions occur also in the *Thereva turneri*-group (cf. Text-figs 359–360) and this group can probably be motivated as the sister-group to *Caenophthalmus*. Also the structure of the male terminalia (paraproct, dorsal apodeme) points in that direction.

KEY TO SPECIES OF *CAENOPHTHALMUS*

MALES

1 Tergites 2–7 with whitish grey tomentose posterior bands, each band occupying at least half of the tergite. *Dc* setae absent. Proboscis short and not reaching to level of antennal bases 2

– Tergites 2–7 largely black, at most with triangular whitish grey tomentose spots on posterior margins. *Dc* setae present in 1–2 pairs. Proboscis longer, reaching to or beyond level of antennal bases 3

2 All femora blackish grey and with exclusively whitish pile. Tibiae slender and with exclusively whitish pile. Apical part of wing spotted with areas of dark microtrichia **gracilis** (p. 341)

– F_3 largely yellowish brown, and f_1 and f_2 yellowish brown in apical half or so. Tibiae incrassate and with mixed blackish and whitish pile as on femora. Apical part of wing not distinctly spotted . . . . **similis** (p. 343)

3 Tergites 4–7 with very distinct whitish grey tomentose triangular spots, the height of which corresponds to half or more of tergal length. Mesonotum with two very distinct whitish grey stripes which are drop-shaped dilated posteriorly. **capensis** (p. 339)

– Tergites 4–7 with indistinct and smaller greyish tomentose triangular spots, or practically all black. Mesonotum distinctly striped, but stripes of a more greyish brown colouration and not so distinctly dilated posteriorly 4

4 Frons largely with whitish pile, only a couple of rows of black setae above. Eyes touching for a distance equal to twice the height of ocellar triangle. Smaller species, 7–9 mm in total length . . . . **irwini** (p. 340)

– Frons largely with blackish pile, only area above antennal bases with whitish pile. Eyes touching for a distance equal to height of ocellar triangle. Larger species, 9·5–10·0 mm in total length . . . . **bellus** (p. 337)

FEMALES

(Female of *similis* is unknown.)

1 One pair of scutellar setae. *Dc* setae absent. Tergites 3–7 largely whitish grey tomentose, with narrow, parallel-sided, blackish anterior bands. Wings very strongly spotted . . . . **gracilis** (p. 341)

– Two or more pairs of scutellar setae. *Dc* setae usually present. Tergites 3–7 with broader black anterior bands which are semicircularly widened laterad of mid line. Tergites also extensively whitish grey tomentose posteriorly 2

2 Proboscis relatively short, not approaching level of apex of first antennal segment. Mesonotum indistinctly striped, stripes being brownish grey . . **irwini** (p. 340)

– Proboscis long, reaching to level of apex of first antennal segment. Mesonotum more distinctly striped, at least drop-shaped posterior part of paler stripes well-marked, whitish grey . . . . . . **bellus** (p. 337) and **capensis** (p. 339)

Caenophthalmus bellus Kröber

(Text-figs 440–447)

Caenophthalmus bellus Kröber 1931 : 128. Holotype ♀, South Africa (TM) [examined].

Diagnosis. ♂. As in *capensis* and *irwini* with distinct *dc* setae and tergites largely black, at most with indistinct greyish tomentose triangular spots on posterior tergites. Mesonotum distinctly striped, frons largely with black pile and eyes touching for a rather short distance. The largest species of the genus, 9·5–10·0 mm.

♀. Very similar to ♀ of *capensis*. Both species have a distinctly striped mesonotum, the stripes being drop-shaped dilated posteriorly, a long proboscis, *dc* present, and 2 pairs or more of *sc* setae.

Redescription. ♂. *Head* (Text-fig. 440). Facial index 0·94. Proboscis reaches to level of middle of or to apex of first antennal segment. All parts of head whitish grey tomentose. Pile of frons and face very long and dense. The hairs are blackish on upper part of frons and on lateral parts of face, whitish on lower frons and central area of face, the differently coloured hairing being sharply demarcated. A group of dark coloured hairs on genae. Numerous (ca 100 on each side) fine and long black post-ocular setae. First, second and basal section of third antennal segments whitish grey tomentose; the rest of third segment and style black. First segment with strong black setae at apex and additional long whitish hairs on whole surface.

Thorax. Mesonotum with three marked subshining brownish black bands separated by two narrow greyish stripes which may be indistinct on middle. Also anterior and lateral parts greyish. Mesonotal pile long and composed of whitish and blackish hairs. Scutellum exclusively dark brownish and with long whitish and blackish hairs. Pleura greyish to greyish brown, with whitish pile. 1–2 *sa* and 1–2 *dc* setae. 4 *sc* setae, but additional marginal setae may occur.

Wings. Vein R_4 strongly S-curved. Colour whitish hyaline. Veins predominantly pale brownish, but darker brownish distally. Greyish shadows may occur around cross-veins, fork of vein R_{4+5} and less distinctly along distal portion of the veins. Halteres with blackish knobs.

Legs. F_2 with 1 *av* seta and usually 1 *ad* seta near apex. F_3 with 5–7 *av* setae in apical two-thirds, several *ad* setae in apical half, and 1–2 *pv* setae in apical half. T_1 with 3–5 *ad*, *pd* and *pv* setae. T_2 and t_3 with rows of long *ad*, *pd*, *av* and *pv* setae. All tibial setae strong and black, and tibiae have additional long and erect pile composed of both black and whitish hairs. Coxae pale greyish. Femora predominantly yellowish brown, f_1 and f_2 blackish grey on dorsal surfaces and also greyish tomentose on ventral surfaces of basal fourth. F_3 blackish grey on posterodorsal surfaces. F_1 and f_2 have long, erect pile of mainly whitish hairs on posterior surfaces, the pile on f_3 being more adpressed and composed of both blackish and whitish hairs. Tibiae and tarsi yellowish brown, tarsi with darkened apices.

Abdomen. Seen dorsally all tergites appear mat blackish. Greyish orange hind marginal seams occur on all segments and small greyish triangular median spots are often present on posterior margin of tergites 4–7. Lateral parts of tergites (the parts which are invisible in dorsal view) are orange-grey on tergites 1–4, greyish on the rest, and sharply limited from the blackish dorsal areas. Corresponding to this, sternites 1–4 are orange and only slightly tomentose, whereas the rest is greyish. Abdominal pile long and whitish.

Terminalia (Text-figs 441–447). Epandrium and gonocoxites blackish, with both whitish and blackish hairs. Epandrium shaped as shown in Text-fig. 443. Gonocoxite (Text-fig. 441) deeply concave above, lower part projecting. Stylus comparatively slender and S-curved. Ventral lobe narrow and long. Phallic part of aedeagus in lateral view (Text-fig. 444) long, narrow and gradually down-curved. Dorsal apodeme very flat, its distal part down-curved. Seen dorsally (Text-fig. 445) the phallus is very broad proximally and rapidly narrowed. Dorsal apodeme broad, its distal margin slightly incurved. Ventral apodeme short and narrow, and ejaculatory apodeme forming a short narrow stick. Tergite 8: Text-fig. 446. Sternite 8: Text-fig. 447.

♀. *Head* (Text-fig. 440). Facial index 0·97. Whole frons greyish to greyish brown tomentose, but two lateral triangular areas of dark brownish tomentum on upper frons. These areas bear a very dense and long black pile. Rest of frons with more sparse pile composed of both blackish and whitish hairs. Face, genae and occiput whitish grey tomentose and with pile as in male. Only a few (3–5) post-ocular setae on each side, and below these a similar number of occipital setae. Proboscis, palpi and antennae as in male.

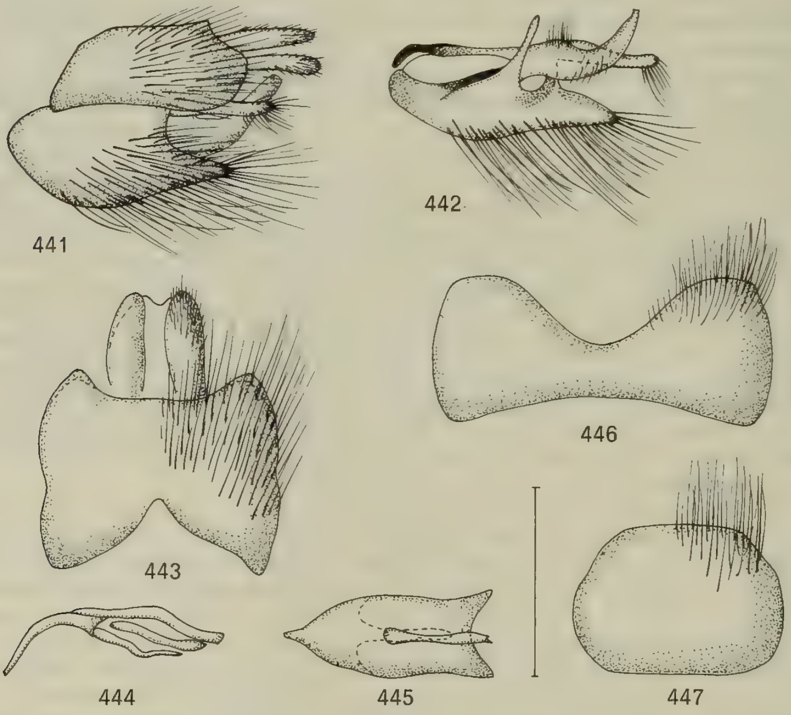
Thorax. Pattern and chaetotaxy as described for male. Pile shorter; whitish hairs on mesonotum adpressed.

Wings. With more distinct dark greyish shadows than in male.

Legs. Almost as described for male, but femora generally less darkened.

Abdomen. Tergites 2–7 with subshining blackish anterior bands, occupying about half or more of tergal length in mid line on the first tergites; towards lateral margin at first dilating, then suddenly constricted before reaching actual lateral margin of tergites. Posterior and lateral parts of the same tergites pale greyish tomentose. Venter greyish orange to greyish brown. Tergal pile moderately long, black on the blackish bands and on lateral areas of first tergites and exclusively on tergites 5–7, whitish and adpressed on greyish bands of tergites 2–4. 6 + 6 terminal spines which are moderately long and bluntly tipped.

Total length 8·6–10·4 mm.



FIGS 441–447. Male terminalia of *Caenophthalmus bellus*. 441, genitalia in lateral view; 442, right gonocoxite in intero-ventral view; 443, epandrium in dorsal view; 444, aedeagus in lateral view; 445, aedeagus in dorsal view; 446, tergite 8; 447, sternite 8. Scale: 0·5 mm.

Material examined.

Holotype ♀, South Africa: 'Capland', Stellenbosch, 6.x.1926 (*Dr H. Brauns*) (TM); the type is in a good condition.

South Africa: 'Capland', Stellenbosch, 1 ♂, 20.ix.1918, 3 ♂, 1 ♀, 4.ix.1926 (*Dr H. Brauns*) (TM & ZMC); same locality, 1 ♂, 23.viii.1928 (*L. Kriegler*) (TM); 8 km N. of Nieuwoudtville, 1 ♀ (SAM); W. Cape, Wellington dist., Bainskloof, ca 600 m, 1 ♂, 4–5.x.1959 (*B. & P. Stuckenberg*) (NM).

***Caenophthalmus capensis* sp. n.**

(Text-figs 448–454)

Diagnosis. ♂. As in *bellus* and *irwini* with distinct *dc* setae and tergites largely black, though with more distinct greyish tomentose triangular spots on last tergites. Mesonotum with two very distinct whitish grey stripes which are drop-shaped dilated posteriorly.

♀. See diagnosis of ♀ of *bellus*.

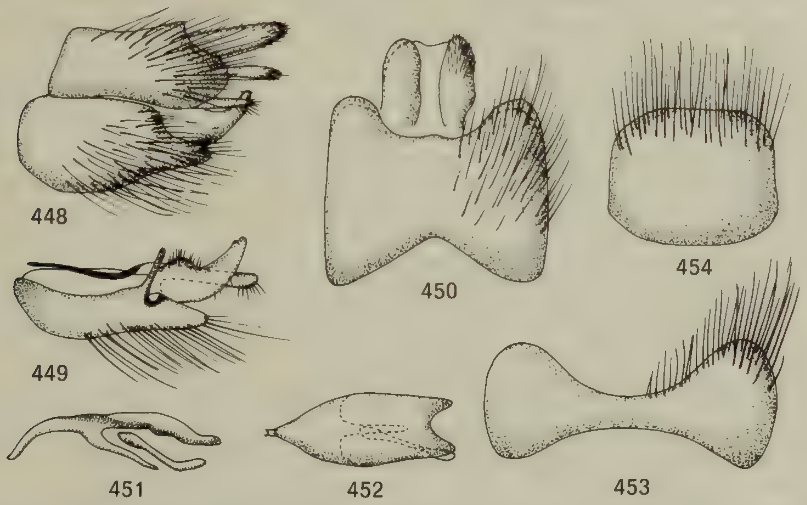
Description. ♂. *Head.* Facial index 0·93. All characters exactly as described above for *bellus*, but dark tuft of hairs on gena less distinct.

Thorax. Whitish grey stripes separating the broad brownish black bands very narrow on anterior two-thirds, drop-shaped dilated posteriorly. Mesonotal and scutellar pile exclusively whitish. 1 *sa* and 1 *dc* setae. Otherwise as in *bellus*.

Wings. Cell M_3 may be open, closed at wing margin or short petiolate. Colour as in *bellus*, but greyish shadows usually less pronounced.

Legs. As described for *bellus*.

Abdomen. Tergites largely black as in *bellus*, but with larger greyish triangular spots placed on posterior margins. These spots are small on tergites 2–3, larger on tergites 4–7, where they occupy half or more of tergal length in mid line. Lateral areas of tergites greyish to greyish



Figs 448–454. Male terminalia of *Caenophthalmus capensis*. 448, genitalia in lateral view; 449, right gonocoxite in intero-ventral view; 450, epandrium in dorsal view; 451, aedeagus in lateral view; 452, aedeagus in dorsal view; 453, tergite 8; 454, sternite 8. Scale: 0·5 mm.

orange, and also greyish orange hindmarginal seams. Sternites greyish orange. Abdominal pile all whitish.

Terminalia (Text-figs. 448–454). Only small differences from *bellus*. Stylus (Text-fig. 449) seems shorter and stouter. Phallic part of aedeagus (Text-fig. 451) is shorter, and aedeagus in dorsal view (Text-fig. 452) narrower.

Total length 7·7–8·5 mm.

♀. Very similar to ♀ of *bellus*, but an overall smaller species. The three specimens available are teneral and therefore a description of the colouration is impossible. Total length from about 7 to about 9 mm.

MATERIAL EXAMINED.

Holotype ♂, SOUTH AFRICA: Cape Prov., Pearly Beach, Bredasdorp (SAM).

Paratypes. SOUTH AFRICA: same data as holotype, 1 ♀ (SAM); Cape Town, 5 ♂, ix. 1913, 1 ♀, 1913, 1 ♀ without date (*G. Peringuey*) (SAM & ZMC); Cape Prov., Albertinia, 1 ♂, 15.viii.1930 (*R. E. Turner*) (BMNH).

***Caenophthalmus irwini* sp. n.**

DIAGNOSIS. Moderately sized species, up to 9 mm in total length. ♂. Tergites practically entirely black, at most with small greyish tomentose, triangular spots on posterior tergites. *Dc* setae present and eyes touching for a long distance. ♀. *Dc* and 2 pairs of *sc* setae present. Proboscis relatively short, not reaching apex of first antennal segment and mesonotum indistinctly striped.

DESCRIPTION. ♂. *Head*. Facial index 0·97. Eyes touching for a distance equal to twice the height of ocellar triangle. Proboscis reaches to level of antennal bases. Whole head whitish grey tomentose and with mainly long whitish pile; only a narrow strip of black hairs from top of frons down to genae. About 50 long and fine postocular setae on each side. Antenna practically as in the type-species (Text-fig. 440).

Thorax. Mesonotum brownish black, with two narrow and not well-marked greyish brown stripes. Scutellum dark brownish. Pleura greyish. Thoracic pile long and whitish. 1 *sa* seta, 1–2 *dc* setae. 2 pairs of *sc* setae.

Wings. Cell M_3 short petiolate. Vein R_4 gently S-curved. Colour greyish hyaline. Very indistinct darker clouding around cross-veins and fork of R_{4+5}. Stigma black. Anterior veins pale brownish, other veins blackish. Halteres with blackish knobs.

Legs. F_2 with 1 *av* seta. F_3 with 6–8 *av* setae for nearly whole length, some additional *ad* setae and a single *pv* seta near apex. Coxae greyish. Femora usually mostly greyish, but sometimes more or less brownish ventrally on apical part, especially on f_3. Femoral pile mostly whitish, but many black hairs are intermixed at apex of f_3. Tibiae and tarsi as in *bellus*.

Abdomen. Tergites nearly all deep black, but not especially shining. A small brownish grey triangular spot at middle of posterior margin of last tergites, but these spots often very indistinct. Pile long and whitish, bands of shorter and more adpressed hairs occur along posterior margin of all tergites. Venter mainly orange and whitish haired, often more or less greyish tomentose.

Terminalia. These are very similar to the terminalia of *capensis* (Text-figs 448–454). The only difference found lies in the shape of sternite 8. This is distinctly wider and shorter in *irwini* than the nearly square-shaped sternite 8 in *capensis* (cf. Text-fig. 454).

Total length 6·9–8·9 mm.

♀. *Head*. Facial index 0·90. Upper part of frons brownish tomentose, rest of frons and other parts of head greyish to whitish grey tomentose. Proboscis longer than in male. Frons with long pile of blackish hairs, on lower part whitish hairs are intermixed. Face with predominantly whitish hairs. On genae a tuft of long, black hairs. 5–6 postocular setae, and a few occipital setae also present. Antenna as in the male.

Thorax as described for male, but pile shorter and scutellum may have additional lateral setae.

Wings strongly spotted by areas of dark microtrichia, but otherwise as in male.

Legs. Chaetotaxy as in male. Colour of femora nearly uniformly dark brownish, only greyish tomentum on anterior four femora. Femoral pile much darker than in male, and tibial pile blackish on t_1, t_2 and ventrally on t_3, paler on dorsal surface of t_3.

Abdomen. Tergites 2 and 3 with black anterior bands occupying slightly more than half tergal length. These bands nearly parallel-sided. Rest of tergites 2–3 greyish tomentose. Also tergites 4–6 with black anterior bands. These bands are as a whole narrower and are semicircularly widening laterad of mid line, and then suddenly constricted laterally. Posterior parts of these tergites and also tergite 7 greyish or brownish tomentose. Pile mainly pale, but black on the black anterior bands. Sternites brownish grey tomentose. 7 + 7 terminal spines on ovipositor.

Total length 7·4 mm.

MATERIAL EXAMINED.

Holotype ♂, SOUTH AFRICA: Cape Prov., Botterkloof Pass, top of, 700 m, white dune assoc., 3119 6d, 16.viii.1973 (*M. E. Irwin*) (NM).

Paratypes. SOUTH AFRICA: same locality as holotype, 5 ♂, 13.ix.1972, 10 ♂, 1 ♀, 16.viii.1973 (*M. E. Irwin*) (NM & ZMC); Cape Prov., 3 km NNE. of Pakhuis Farm, Pakhuis Mts, 550 m, 3219 Aa, 1 ♂, 14.ix.1972 (*M. E. & B. J. Irwin*) (NM); Pakhuis Pass, east side, 600 m, meadow with flowers, 3219 Aa, 2 ♂, 17.viii.1973 (*M. E. Irwin*) (NM).

***Caenophthalmus gracilis* sp. n.**

(Text-figs 455–459)

DIAGNOSIS. ♂ ♀. Tergites 2–6 with extensive areas of whitish grey tomentum. *Dc* setae absent and only 1 pair of *sc* setae. All femora usually greyish black, f_3 in ♀ often brownish translucent.

DESCRIPTION. ♂. *Head.* Facial index 0·90. Proboscis short, not reaching to level of antennal bases. Head totally whitish grey tomentose and with long whitish pile; only black hairs on a strip from top of frons along eye-margins down to genae. Post-ocular setae long, fine and black, ca 30 on each side. Antennae practically as in *bellus* (Text-fig. 440) but apex of segment 3 longer and more slender, and apical section of style distinctly broader than basal section.

Thorax. Mesonotum with ill-defined pattern of brownish and greyish bands and stripes. Scutellum brownish. Pleura greyish. Thoracic pile long and exclusively whitish. Only 1 *sa* seta. *Dc* setae absent. Only 1 pair of *sc* setae.

Wings. Cell M_3 short petiolate. Vein R_4 with proximal half nearly straight, while distal half is gently curved. Colour greyish hyaline. A very marked blackish stigma present, and an indistinct pattern of spots formed by areas with darker microtrichia in apical half of wing. Veins blackish, but brownish in basal part of wing. Halteres with blackish knobs.

Legs. F_2 with 1 *av* seta. F_3 with 2–6 *av* setae in apical half, 2–3 *ad* setae near apex, and a single *pv* seta near middle. Tibial setae as in *bellus*. Coxae and femora blackish grey tomentose, and with long and exclusively whitish pile. Tibiae yellowish brown with long whitish pile in addition to the black setae. Tarsi yellowish brown with apices of first three segments and last two segments totally black.

Abdomen. Tergite 2 black with posterior third whitish grey tomentose. Tergite 3 as tergite 2, but with broader band of tomentum posteriorly. Tergites 4 and 5 predominantly whitish grey tomentose, but with a dark median spot and dark lateral spots near anterior margin. Following tergites whitish grey. Venter uniformly brownish grey. Abdominal pile long and exclusively blackish.

Terminalia (Text-figs. 455–459). Compared with terminalia of *bellus* (Text-figs 441–447) smaller. Epandrium (Text-fig. 455) with broader pale postero-lateral flaps. Gonocoxite (Text-fig. 456) lower in lateral view and also stylus (Text-fig. 457) narrower and hardly curved. Phallus shorter in lateral view (Text-fig. 458) and more suddenly constricted when seen in dorsal view (Text-fig. 459). Dorsal apodeme very flat in lateral view (Text-fig. 458) and narrower towards distal margin in dorsal view (Text-fig. 459).

Total length 6·2–6·8 mm.

♀. *Head.* Facial index 0·92. Upper part of frons dark brownish tomentose, lower part of frons and rest of head greyish to whitish grey tomentose. Proboscis longer than in male, reaching beyond level of antennal bases. Frons and face with long pile of both whitish and blackish hairs. Only a few short post-ocular setae. Antenna as in male.

Thorax and *wings* as in male, but wings more strongly spotted.

Legs. Femoral chaetotaxy as in male. Femora, especially f_3, often more or less brownish translucent, and not so distinctly blackish grey as in male. Pile of femora shorter, more sparse and not exclusively whitish. Also tibiae with shorter pile, and the pile composed of both blackish and whitish hairs. Rest as in male.

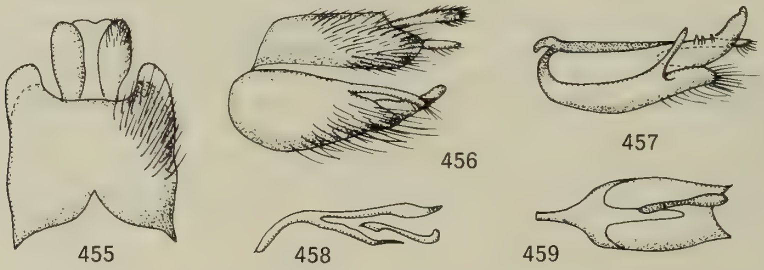
Abdomen. Tergites 2–7 predominantly greyish tomentose, on tergites 2–3 with distinct, black semicircular anterior bands which occupy half tergal length in midline and reach the antero-lateral corners of the tergites. Tergites 4–5 with narrower blackish bands which are slightly broadened laterad of mid line. Tergites 6–7 more diffusely brownish tomentose anteriorly. Venter greyish to brownish grey tomentose. Abdominal pile shorter than in male and includes black hairs on dark tergal bands and on posterior sternites. 6 + 6 terminal spines on ovipositor.

Total length 6·8–7·2 mm.

MATERIAL EXAMINED.

Holotype ♂, SOUTH AFRICA: Cape Prov., 5 km NE. of Muizenberg, 10 m, coastal dunes, 3418 Ab, 24.viii.1973 (*M. E. Irwin*) (NM).

Paratypes. SOUTH AFRICA: same data as holotype, 8 ♂, 5 ♀ (NM & ZMC); Cape Prov., 21 km S. of Langebaan, 30 m, coastal dunes, 3318 Aa, 2 ♂, 1 ♀, 18.viii.1973 (*M. E. Irwin*) (NM).



FIGS 455–459. Male terminalia of *Caenophthalmus gracilis*, holotype. 455, epandrium in dorsal view; 456, genitalia in lateral view; 457, right gonocoxite in intero-ventral view; 458, aedeagus in lateral view; 459, aedeagus in dorsal view. Scale: 0·5 mm.

Caenophthalmus similis sp. n.

DIAGNOSIS. ♂. Tergites 2–6 with whitish grey tomentose bands posteriorly as in *gracilis*, and *dc* setae absent as in this species, but femora extensively yellowish brown in apical half or more, and tibiae more incrassate than in *gracilis*.

♀. Unknown.

DESCRIPTION. ♂. *Head*. Facial index 0·97. Eyes touching for a distance equal to height of ocellar triangle. Proboscis reaches to level of antennal bases. Head whitish grey tomentose. Pile of frons and face long and nearly exclusively whitish, only a few black hairs present on upper part of frons. On genae a tuft of black hairs. Post-ocular setae shorter and fewer in number than in other species of the genus, about 20 setae on each side. Antenna practically as in the type-species (Text-fig. 440).

Thorax. Mesonotum brownish black with two rather well-marked paler greyish stripes. Scutellum brownish black. Pleurae greyish. Thoracic pile moderately long and whitish. Only 1 *sa* setae. *Dc* setae absent. 2 pairs of *sc* setae, sometimes an additional lateral *sc* seta.

Wings. Vein R_4 gently S-curved. Colour greyish hyaline. Very indistinct darker clouding around cross-veins and fork of R_{4+5}. Stigma black. Veins pale brownish in anterior and basal parts of wing, blackish in the rest. Halteres with blackish knobs.

Legs. F_2 with 1 *av* seta. F_3 with 4–5 *av* setae in apical half, and a few *ad* setae near apex. Femora yellowish brown, but basal half of f_1 and f_2 greyish black and also extreme base of f_3 greyish black. Femoral pile whitish and long, black hairs are present at apex of f_3. Tibiae and tarsi yellowish brown, tarsal segments with darkened apices.

Abdomen. Tergites 2–6 with blackish anterior bands, the rest of the tergites being greyish tomentose. The bands of the first tergites are nearly parallel-sided and occupy more than half tergal area, while the bands of the last tergites are semicircularly widened laterad of mid line. Tergal pile all whitish and long. Sternites greyish.

Terminalia. These can hardly be distinguished from those of *gracilis* (cf. Text-figs 455–459). Phallic part of aedeagus probably less suddenly constricted in *similis* than in *gracilis* (Text-fig. 459).

Total length about 7 mm.

♀. Unknown.

MATERIAL EXAMINED.

Holotype ♂, SOUTH AFRICA: Cape Prov., 5 km E. of Orchard, 500 m, low dunes, 3319 BC, 19.viii.1973 (*M. E. Irwin*) (NM).

Paratypes. SOUTH AFRICA: same data as holotype, 2 ♂ (NM & ZMC).

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Synonyms are in *italics*; principal references are in **bold**.

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A REVISION OF THE GENUS *AMASTRIS* (HOMOPTERA : MEMBRACIDAE)

P. S. BROOMFIELD

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
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BY

PETER SAINSBURY BROOMFIELD

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By P. S. BROOMFIELD

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SYNOPSIS

The genus *Amastris* is redefined and fully revised. Forty-nine new species are described, two lectotypes are designated, one specific name is newly synonymized and removed from the genus, and four previously synonymized specific names are reinstated. Two keys, one based on external characters, the other on male genitalia, are provided for the identification of the sixty-eight species examined.

INTRODUCTION AND HISTORICAL REVIEW

THE tribe Amastrini belongs to the subfamily Smiliinae and was originally proposed by Goding (1926 : 312) under the name Amastrisini to include the genera *Amastris* Stål, *Boethoos* Kirkaldy, *Tynelia* Stål, *Vanduzea* Goding, *Hygris* Stål, *Idioderma* Van Duzee, *Gelastophora* Kirkaldy, *Erosne* Stål, and *Lallemandia* Funkhouser. Funkhouser (1927 : 299) synonymized Amastrisini with the tribe Polyglyptini Goding and included all the above genera except *Erosne*, which he transferred to the tribe Smiliini Goding, and *Gelastophora*, which he synonymized with the genus *Hemiptycha* Germar in the subfamily Darninae. Three years later Goding (1929 : 263) reinstated the Amastrisini for the original nine genera and amended the name to Amastrini. He also recognized *Gelastophora* as a synonym of *Hemiptycha* which he transferred to the Amastrini, and at the same time synonymized *Idioderma* with *Hygris*. This arrangement was subsequently accepted by Funkhouser (1950 : 135), with the exception of *Hemiptycha* which he transferred back to the Darninae. He also included the genus *Bajulata* Ball in the Amastrini, and reinstated *Idioderma* as a distinct genus. Metcalf (1965 : 871) transferred the genera other than *Amastris* to the tribe Polyglyptini, and synonymized *Boethoos* with *Harmonides* Kirkaldy. Although the inclusion of these genera in the Polyglyptini is not regarded as necessarily correct, it does appear that the differences between them and *Amastris* are such as to justify their removal from the Amastrini.

The genus *Amastris* itself was originally proposed by Stål (1862 : 29) to accommodate three new species from Brazil, *fallax*, *simillima*, and *consanguinea*. Later Stål (1869) transferred *Membracis obtegens* Fabricius to the genus, and Goding (1894) described *Vanduzea laeta*, and, in the same paper, as an addendum, transferred it to *Amastris*. This later combination has, however, been ignored by Van Duzee (1908) and subsequent authors. The genus remained limited to four species until Funkhouser (1922) described another six new species, *brunneipennis*, *maculata*, and *sabulosa* from Brazil, and *elevata*, *minuta*, and *projecta* from Peru. Haviland (1925) added two more new species, *vismiae* and *funkhouseri* from Guyana, and in 1927 Funkhouser himself transferred *Thelia compacta* Walker (1858) to *Amastris*, synonymized *fallax* with it, and designated *compacta* as the type-species of the genus; he also included in *Amastris* the species *Membracis antica* Germar (1821) from Brazil, '*Cicada flavifolia* Stoll (1788)' from Surinam, and *Thelia citrina* Fairmaire (1846) from Colombia. Goding (1929 : 263) published the first key to the species of the genus and proposed five new synonymies, reducing the number of valid species to eleven. The known range of the genus was greatly increased when Ball (1933) described two species, *templa* and *lycioda*, from the southern U.S.A. Funkhouser (1940) added *peruviana*, another species from Peru, and Fonseca (1941) described *guttata* from Brazil. In 1943 Funkhouser also described *pacifica* from Guatemala. (As a result of the present study this species is removed from *Amastris* – see p. 422.)

The published work on *Amastris* subsequent to that noted above is extremely limited; the major publications are those of Funkhouser (1950) which includes a generic description, a list of species, and a key to the genera of the Amastrini, and Metcalf (1965) who gave a catalogue of species and an extensive bibliography.

The designation of type-species by Funkhouser (1927), noted above, has led to some confusion. In accordance with Article 69 (a) (iv) of the *International Code of Zoological Nomenclature*, *fallax* is the type-species of *Amastris*. An examination of the types of *compacta* and *fallax*, carried out in the present study, has revealed them to be distinct species; *fallax* is therefore reinstated as a valid name.

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TECHNIQUES

Although all the species involved in the present study may be distinguished by external characters alone (usually the size and proportions of the pronotum and head, and sometimes also the pigmentation), some of these differences may occasionally be very slight. For this reason the structure of the male genitalia, in particular the aedeagus, is used here for the first time as a reliable means of separating the majority of species, especially those most similar externally.

The measurements of the pronotum as used in the text are taken as follows: the total length of the pronotum is measured along a line running from the anterior edge of the metopidium, through the humeral angle, to the posterior apex; the maximum height of the pronotum is measured along a line running perpendicular to the above, from the level of the humeral angle to the highest point of the dorsum; the maximum width of the pronotum is measured across the humeral angles. These, and the measurements of the head, are arranged in the text as follows: the size range of the pronotum of all available specimens, followed by the full head and pronotal measurements for one specimen, usually a male, near the mean for the series to show the relative proportions. The proportions for all specimens of a species are similar unless otherwise stated. Female pronotal measurements are also given where specimens are available.

The position of the ocelli is measured relative to a line (the centro-ocular line) running through the centre of the eyes. The presence or absence of shallow indentations in the sides of the pronotum is a consistent and useful character, and is best observed with the naked eye or with a hand lens, or, if a microscope is used, with the incident light at an acute angle to the surface. Due to the difficulty of accurately describing the relative curvature of the pronotum in many species reference should be made to the text-figures.

The terms used in the text are those in common current usage for the various morphological characters of the Membracidae and other families of the Auchenorynchous Homoptera. Those used to describe the tegmina may be found in Funkhouser (1950 : 44); while those concerning the head and pronotum are given by Capener (1968 : 3), with the exception of the term 'frontoclypeus' which is used here to denote that part of the clypeus which is visible when the head is viewed anteriorly, and the 'dorsum' which refers to the dorsal surface of the pronotum posterior to the metopidium.

Due to the close external similarity between many species, extensive reference is made to the structure of the male genitalia, of which the shaft of the aedeagus has been found to show a consistent, and often considerable, degree of diversity between species, especially those with a highly elevated pronotum. There are also lesser, but distinct, differences between the parameres of many species.

The diagnostic features of both aedeagus and paramere are heavily chitinized and do not require staining. The method of preparation is similar to that used for the genitalia of the majority of the Auchenorynchous Homoptera. The genitalia, together with the last three abdominal segments, are removed from the specimen, macerated in KOH and examined in glycerine. The structure of the shaft and of the distal portion of the paramere can often be observed without further dissection. The majority of the diagnostic characters of the shaft are visible in lateral aspect, though to ascertain the number of rows of spines across the anterior surface in some species, it is necessary that it be examined from the posterior aspect.

Most previous workers on the Membracidae have either ignored the structure of the male genitalia, or have noted it without commenting on its possible taxonomic significance (i.e. Capener, 1968 : 2). However, the remarkable diversity between the various forms of aedeagus revealed by the present study has shown relationships within *Amastris*, and between it and other closely related genera, which form the basis for the species groupings and discussion as set out on p. 354. In contrast to the aedeagus, the paramere appears to have no taxonomic significance above specific level.

DISTRIBUTION

The majority of the species of *Amastris* are Neotropical in distribution. They occur mostly in forest and savanna areas, often those with high rainfall. Their evolution seems to have been confined to the territories to the east and north of the Andes, and to the northern end of that mountain range in Central America. As far as is known, no species has been recorded from the high Andes of Peru or from the fertile valleys crossing the western coastal desert of that country.

The great majority of species, including most of the forms with a highly elevated pronotum and the maximum variation in the structure of the male genitalia, are recorded from South America. Species are recorded from Brazil, Colombia, Peru, Ecuador, Guyana, Surinam, French Guiana, Venezuela and Bolivia, and the southern limit appears to be in Paraguay. Nine species are recorded from Central America, from Guatemala, Nicaragua, Costa Rica, Mexico, Panama, and British Honduras (Belize). The only species recorded from the Caribbean, from Trinidad, is also found in Guyana. Only two species have been recorded from the Nearctic Region, one from Utah and the other from Arizona. The fact that both these species have a low pronotum and a restricted range well separated from the rest of the genus by the Mexican Desert, suggests that they represent a relict fauna, are relatively primitive, and are closer to the ancestral stock than many of those species occurring in the Neotropical Region (see discussion on p. 354).

As far as can be ascertained from the available material, the majority of species are very restricted in their distribution. Many of the previous records are unreliable due to the external similarity between many of the species and their resemblance is some cases to those of other genera.

AMASTRIS Stål

Amastris Stål, 1862 : 29. Type-species: *Amastris fallax* Stål, by subsequent designation (Funkhouser, 1927 : 302, as *Amastris compacta* (Walker)) under Article 69 (a) (iv) of the *Code*.

Head large, vertical or inclined slightly backwards, never sloping forwards; width nearly as great as maximum width of pronotum; surface almost flat, slightly raised between ocelli, finely, irregularly, and obscurely ridged and punctate; pubescence sparse, long, strong, erect. Eyes large, prominent. Frontoclypeus trilobed, often very obscurely so. Rostrum robust, reaching middle of hind coxae.

Pronotum with maximum width across humeral angles, tapering regularly to posterior apex, without lateral horns or processes; dorsum smoothly and regularly curved; median carina distinct, percurrent, arising near base of metopidium; lateral carinae absent; pubescence sparse, long, erect. Metopidium triangular with supra-ocular callosities obscure and impunctate.

Tegmen always partially covered by pronotum, with most of anal area and part of corium concealed; with five apical and three discoidal cells. Basal part of subcostal cell and exposed areas of anal cells coriaceous and punctate, with scattered short, erect pubescence. Subcostal cell occupying approximately two-thirds total length of costal margin. Third apical cell at apical angle of tegmen, broader than long, base almost straight or obtusely angled, posterior margin broadly rounded. Fifth apical cell very large, often as great in area as all other apical cells together, almost or completely concealed by pronotum. Wings with four apical cells, second acutely angled basally.

Pigmentation variable; the majority of species green in life, dull yellowish brown in preserved specimens; with or without darker markings on pronotum, tegmen, or ventral surfaces.

Male genitalia with structure of aedeagus extremely variable; shaft vertically or posteriorly directed, with or without spines on anterior surfaces, occasionally with basal or subapical processes; basal apodeme always vertical. Paramere strongly recurved and heavily chitinized distally, with a number of slender erect spines subapically.

There is no single character which separates *Amastris* from all other genera of the Amastrini (sensu Funkhouser, 1950), but the combination of three discoidal cells in the tegmen and the prominent keel-like median carina which runs the entire length of the pronotum is sufficient to distinguish it.

Those species with the pronotum highly elevated bear a close superficial resemblance to those of the other New World genera *Archasia* and *Antianthe* (Smiliinae : Smiliini) and *Cymbomorpha* (Darninae : Cymbomorphini), but may be readily separated from them by the presence of the three discoidal cells in the *Amastris* tegmen. *Amastris exaltata* bears a strong resemblance in size and pronotal development to *Hille maculicornis*, but differs in that the latter species has faint lateral carinae on the pronotum and only two discoidal cells in the tegmen.

Among those species of the other genera of the Amastrini (sensu Funkhouser) of which specimens have been available for the present study, only *Erosne notata* Walker (which is synonymized by Metcalf (1965) with *Hille maculicornis* Fairmaire) has the pronotum highly elevated and keel-like. The species of the genera *Boëthoos*, *Vanduzea*, *Bajulata*, *Tynelia*, *Idioderma*, and *Hygris* (all removed to the Polyglyptini by Metcalf, 1965) all have the median carina of the pronotum weak, obsolete, or not extending the entire length of the dorsum; and the pronotum is in consequence much more rounded in cross-section. The single species of *Lallemandia*, *nodosa* Funkhouser, is characterized by the tumid elevations of the pronotum and the lack of a percurrent median carina. All the species of the above genera where males have been available for study, as well as *Polyglypta costata* Burmeister, have a simple, U-shaped aedeagus, with the shaft directed vertically and without lateral processes.

This combination of relatively undeveloped pronotum and simple U-shaped aedeagus is therefore seen to be the most common condition within the Amastrini (sensu Funkhouser) and is thus regarded as being the primitive state. Those species of *Amastris* which are of this form are therefore considered to be more primitive than those in which the pronotum is highly elevated and the aedeagus a highly complex structure.

Of the genera of the Amastrini, only *Vanduzea* and *Amastris* occur in both the Nearctic and Neotropical regions. All the other genera are restricted to the Neotropical region, except for *Bajulata*, which is known only from a single species from Arizona. It is thus assumed that *Amastris* first evolved as a distinct genus in Central America or the northern part of South America, and that the two Nearctic species, *lycioda* and *templa*, reached the United States before the formation of the Mexican Desert which effectively isolated them from the more advanced forms evolving in the south. This hypothesis is supported by the fact that these two species have the pronotum little elevated and the aedeagus U-shaped; though not quite as simple as in some other species (Text-figs 223, 252).

The species of *Amastris* fall into seven well defined groups based on the degree of pronotal development and on the structure of the aedeagus. The genitalic differences between the groups is greater than that existing between the individual genera of the Polyglyptini (sensu Metcalf). These species groups are as follows.

The *funkhouseri*-group. Degree of pronotal development extremely variable, often primitive with the exception of a few species, e.g. *exaltata*. Aedeagus simple, U-shaped; shaft directed vertically, with spines subapical on anterior surface; gonopore subapical on posterior surface. This is the largest group and includes all species for which males are available with the exception of those set out below.

The *obtegens*-group. Pronotum highly elevated. Aedeagus U-shaped; shaft directed vertically, with spines widely separated along the entire length of posterior surface; gonopore apical. *A. obtegens* only.

The *dissimilis*-group. Pronotum highly elevated. Aedeagus U-shaped; shaft directed vertically, apex very greatly expanded laterally with a single vertical row of spines on lateral margins; gonopore subapical on posterior surface. *A. dissimilis* only.

The *flavifolia*-group. Pronotum highly elevated. Aedeagus with shaft horizontal, directed posteriorly; with a pair of short, broad, ventrally directed subapical processes, each with small spines on anteroventral and/or posteroventral surfaces; gonopore apical, between bases of processes. *A. flavifolia* and *A. vismiae* only.

The *interstincta*-group. Pronotum highly elevated. Aedeagus with shaft horizontal, directed posteriorly; with a pair of short, lateral, bifid subapical processes; and with a group of small spines on dorsal surface; gonopore apical. Probably derived from the *flavifolia*-group. *A. interstincta* and *A. ramosa* only.

The *dama*-group. Pronotum highly elevated. Aedeagus with shaft horizontal, directed posteriorly; with a pair of long, much branched apical processes directed posteriorly and curving slightly dorsally; a pair of slightly less branched subapical processes directed anteriorly and ventrally; and a group of small spines dorsally near base of shaft; gonopore apical, between bases of apical processes. Probably derived from the *interstincta*-group. *A. dama* only.

The *vitallina*-group. Pronotum highly elevated. Aedeagus U-shaped; shaft almost vertical, very slender; a pair of posterodorsally directed processes arising near base on posterolateral surfaces; gonopore apical, very small. A very distinct group comprising *A. vitallina* and *A. concolor* only.

The species groups outlined above are based entirely on the structure of the aedeagus. Since many of the species of *Amastris* are known only from female specimens it is considered unwise to describe new genera at the present time on the basis of the above genitalic differences. Pronotal differences between species and species groups are so slight and gradual that no new generic distinction can be based on these or any other external character. It is possible, however, that as the genus becomes better known, it may well prove necessary to divide it along the lines set out above.

It has not as yet been possible to define reliably a male of *fallax*, the type-species of *Amastris*, but it would appear from the study of species with very similar pronotal development, that *fallax* possesses a simple U-shaped aedeagus with the spines clustered subapically on the anterior surface of the shaft and with the gonopore subapical on the posterior surface; it is thus tentatively placed in the *funkhouseri*-group of species.

KEY TO SPECIES OF *AMASTRIS*

(Based on external characters)

The species *antica* Germar and *citrina* Fairmaire are not included in this key due to the absence of reliably determined material for the present study. In some cases the differences between species are slight and the pigmentation somewhat variable; in these instances reference should be made to the figures and, where possible, to the structure of the male genitalia.

1		Pronotum with a short, often indistinct or obsolete, vertically directed horn at junction of metopidium and dorsum	2
–		Pronotum not as above, junction of metopidium and dorsum rounded or angular	5
2	(1)	Pronotum with junction of metopidium and dorsum produced into a short, vertically directed horn (Text-fig. 1) . . .	**exaltata** Walker (p. 376)
–		Pronotum with dorsal horn obsolete or indistinct	3
3	(2)	Pronotum with junction of metopidium and dorsum almost 90°, dorsal horn obsolete	4
–		Pronotum with junction of metopidium and dorsum more obtusely rounded; horn vestigial, very indistinct (Text-fig. 2) . .	**subangulata** sp. n. (p. 378)
4	(3)	Pronotum with posterior apex terminating well before tips of tegmina (Text-fig. 37). Tegmen with apical limbus weakly pigmented	**punctata** sp. n. (p. 384)
–		Pronotum with posterior apex reaching or very nearly reaching tips of tegmina (Text-fig. 4). Tegmen with apical limbus strongly pigmented	**angulata** sp. n. (p. 386)

5 (1) Pronotum with length less than two and a half times height 6

– Pronotum with length greater than two and a half times height 12

6 (5) Pronotum with length less than twice height, almost foliaceous 7

– Pronotum with length two to two and a half times height 8

7 (6) Metopidium with height distinctly greater than width (Text-fig. 93). Exposed area of tegmen unpigmented except for coriaceous areas ***vismiae*** Haviland (p. 371)

– Metopidium with height equal to width (Text-fig. 94). Exposed area of tegmen pale brownish . . . . . . ***elevata*** Funkhouser (p. 410)

8 (6) Exposed area of tegmen unpigmented except for coriaceous areas, and in some cases apical limbus 9

– Exposed area of tegmen darkly pigmented with a clear hyaline spot centrally in basal third (Text-fig. 26) . . . . . ***obtegens*** Fabricius (p. 365)

9 (8) Tegmen with fifth apical cell completely concealed by side of pronotum . . 10

– Tegmen with fifth apical cell not completely concealed (Text-fig. 3). ***flavifolia*** Funkhouser (p. 370)

10 (9) Median carina of pronotum narrowly and distinctly edged with dark brown or black 11

– Median carina concolourous with rest of pronotum, pale yellowish brown (Text-fig. 6) . . . . ***straminea*** sp. n. (p. 415)

11 (10) Metopidium arising almost vertically above head (Text-fig. 35); total length less than 5·0 mm . . . . ***ramosa*** sp. n. (p. 369)

– Metopidium distinctly inclined forwards above head (Text-fig. 32); total length 5·5 mm . . . . ***concolor*** sp. n. (p. 366)

12 (5) Pronotum reddish with distinct irregular pale spots 13

– Pronotum not as above 14

13 (12) Total length of pronotum less than 3·0 mm; posterior apex not reaching tips of tegmina (Text-fig. 31) . . . . . . ***viridisparsa*** sp. n. (p. 392)

– Total length of pronotum 4·0 mm; posterior apex reaching tips of tegmina (Text-fig. 27) . . . . ***guttata*** Fonseca (p. 395)

14 (12) Ventral surfaces of thorax dark brown or black, much darker than posterior part of pronotum 15

– Ventral surfaces of thorax pale, concolorous with or only slightly darker than posterior part of pronotum 27

15 (14) Junction of metopidium and dorsum regularly curved (Text-fig. 39). Metopidium usually concolorous with rest of pronotum 19

– Junction of metopidium and dorsum stepped (Text-fig. 38). Metopidium with irregular brown or black markings 16

16 (15) Tegmen with exposed part of apical limbus darkly pigmented 17

– Tegmen with exposed part of apical limbus clear hyaline 18

17 (16) Sides of pronotum with a dark band running vertically from immediately posterior to humeral angle to median carina at junction of metopidium and dorsum; median carina with prominent dark spots (Text-fig. 38) ***fasciata*** sp. n. (p. 375)

– Sides of pronotum not as above; median carina with indistinct dark spots (Text-fig. 34) . . . . ***sakakibarai*** sp. n. (p. 408)

18 (16) Metopidium smooth in lateral profile (Text-fig. 36), darkly pigmented throughout. Sides of pronotum pale yellowish brown without darker markings ***maculata*** Funkhouser (p. 406)

– Metopidium with distinct transverse indentation near base, immediately below commencement of median carina (Text-fig. 33); darkly pigmented laterally, paler in centre. Sides of pronotum with an irregular dark band at two-thirds distance to posterior apex, not reaching to lower lateral margin ***notata*** sp. n. (p. 398)

19 (15) Pronotum and median carina concolorous 22

– Pronotum with median carina darker edged or with dark spots 20

20 (19) Tegmen pigmented only on coriaceous areas and exposed part of apical limbus 21

– Tegmen with greater part of exposed area brownish hyaline (Text-fig. 39) ***alapigmentata*** sp. n. (p. 383)

21 (20) Pronotum with length slightly less than three times height (Text-fig. 43). Basal two-fifths of subcostal cell coriaceous and punctate ***dissimilis*** sp. n. (p. 364)

– Pronotum with length three and a half times height (Text-fig. 41). Basal three-quarters of subcostal cell weakly coriaceous and punctate ***flava*** sp. n. (p. 393)

22 (19) Exposed part of tegmen darkly pigmented except for part of apical area and first discoidal cell (Text-fig. 44) ***brunneipennis*** Funkhouser (p. 380)

– Exposed part of tegmen pigmented only on coriaceous areas and, usually, apical limbus 23

23 (22) Tegmen with exposed part of apical limbus pigmented, sometimes lightly so. Posterior apex of pronotum usually acute in lateral aspect. Central and South America 24

– Tegmen with exposed part of apical limbus unpigmented. Posterior apex of pronotum rounded in lateral aspect (Text-fig. 40). U.S.A. ***templa*** Ball (p. 420)

24 (23) Tegmen with apical limbus pale yellowish brown, no other pigmentation except on coriaceous areas. Metopidium often with irregular brown markings 26

– Tegmen with apical limbus dark, or if pale then basal area of tegmen dark brown or black. Metopidium concolorous with rest of pronotum 25

25 (24) Basal area of tegmen concolorous with pronotum (Text-fig. 17) ***fonsecai*** sp. n. (p. 382)

– Basal area of tegmen very much darker than pronotum (Text-fig. 22) ***froeschneri*** sp. n. (p. 385)

26 (24) Pronotal length greater than 4·25 mm (Text-fig. 5) ***revelata*** sp. n. (p. 413)

– Pronotal length less than 3·25 mm (Text-fig. 18) ***panamensis*** sp. n. (p. 411)

27 (14) Pronotum unmarked, median carina and metopidium concolorous 43

– Pronotum with distinct darker markings anteriorly and on metopidium, or with median carina narrowly edged black or with dark spots 28

28 (27) Median carina narrowly edged with black or with dark spots throughout its length 29

– Median carina either concolorous with rest of pronotum, or markings not percurrent 40

29 (28) Pronotum unmarked except for dark pigmentation confined to median carina 32

– Pronotum either irregularly mottled or with distinct dark pigmentation on metopidium 30

30 (29) Metopidium dark brown; median carina with numerous dark brown spots (Text-fig. 19) ***pseudomaculata*** sp. n. (p. 399)

– Pronotum not marked as above 31

31 (30) Pronotum indistinctly and irregularly mottled with yellow and brown; median carina with scattered dark spots. Pronotal length less than 3·5 mm. Metopidium rounded in lateral aspect (Text-fig. 45). ***sabulosa*** Funkhouser (p. 414)

– Pronotum with metopidium darker, paler centrally at base and with a short pale band from junction of metopidium and dorsum for half distance towards humeral angles. Pronotal length greater than 5·5 mm. Metopidium rising vertically above head (Text-fig. 54) ***pseudoelevata*** sp. n. (p. 388)

32 (29) Median carina of pronotum with dark spots; with or without narrow black edge 33

– Median carina of pronotum narrowly edged with black; without dark spots 34

33 (32) Pronotal length greater than 5·5 mm. Apical limbus of tegmen yellowish. Subcostal cell with less than basal third coriaceous (Text-fig. 16) ***robusta*** sp. n. (p. 381)

– Pronotal length 4·5 mm. Apical limbus of tegmen dark. Subcostal cell with basal three-quarters coriaceous (Text-fig. 51) . . . ***inermis*** sp. n. (p. 407)

34 (32) Pronotal length over 6·0 mm. Median carina of dorsum highly elevated (Text-fig. 111) . . . 35

– Pronotal length less than 5·0 mm. Median carina of dorsum not highly elevated (Text-fig. 113) . . . 36

35 (34) Exposed part of tegmen except coriaceous areas clear hyaline. Median carina of pronotum abruptly becoming highly elevated on metopidium (Text-fig. 47) . . . ***projecta*** Funkhouser (p. 417)

– Exposed part of tegmen brownish except for large clear spot in basal half, apical limbus dark brown. Median carina becoming gradually elevated towards junction of metopidium and dorsum (Text-fig. 50) ***peruviana*** Funkhouser (p. 416)

36 (34) Tegmen with second, third, and fourth apical cells dark brown. Pronotal length less than 3·5 mm, nearly three times as long as high (Text-fig. 48) ***exigua*** sp. n. (p. 379)

– Tegmen unpigmented except for coriaceous areas, occasionally weakly pigmented on exposed part of apical limbus. Pronotal length more than 4·0 mm, distinctly less than three times height . . . 37

37 (36) Metopidium inclined slightly forwards above head . . . 38

– Metopidium vertical above head before curving posteriorly to junction with dorsum (Text-fig. 56) . . . ***interstincta*** sp. n. (p. 369)

38 (37) Metopidium little wider than high (Text-fig. 85) . . . ***vitallina*** sp. n. (p. 367)

– Metopidium distinctly wider than high (Text-fig. 117) . . . 39

39 (38) Basal area of subcostal cell of tegmen very indistinctly coriaceous and punctate. Head less than twice as broad as long (Text-fig. 55) . ***knighti*** sp. n. (p. 372)

– Basal area of subcostal cell of tegmen strongly coriaceous and punctate.. Head twice as broad as long (Text-fig. 21) . . . ***unica*** sp. n. (p. 374)

40 (28) Junction of metopidium and dorsum a smooth uninterrupted curve in lateral aspect. Sides of pronotum smooth . . . 42

– Junction of metopidium and dorsum distinctly stepped in lateral aspect. Sides of pronotum with shallow indentations . . . 41

41 (40) Pronotal length less than 3·5 mm, posterior apex terminating well before tips of tegmina (Text-fig. 25). . . . ***undulata*** sp. n. (p. 392)

– Pronotal length more than 4·5 mm. Pronotum reaching nearly to tips of tegmina (Text-fig. 23). . . . ***specialis*** sp. n. (p. 400)

42 (40) Pronotal length not more than 3·5 mm. Median carina low, arising gradually from near base of metopidium (Text-fig. 53). Dark markings on pronotum confined to lower central part of metopidium . . . ***janae*** sp. n. (p. 405)

– Pronotal length approximately 4·0 mm. Median carina becoming abruptly elevated some distance above base of metopidium (Text-fig. 7). Whole of metopidium indistinctly mottled dark brown . ***conspicua*** sp. n. (p. 398)

43 (27) Pronotum with junction of metopidium and dorsum smoothly rounded in lateral profile (Text-fig. 14) . . . 47

– Pronotum with junction of metopidium and dorsum distinctly stepped or very acutely rounded in lateral profile (Text-fig. 9) . . . 44

44 (43) Metopidium straight in lateral profile, distinctly inclined forwards above head; junction with dorsum acutely rounded (Text-fig. 20) ***inclinata*** sp. n. (p. 379)

– Metopidium in lateral profile curving regularly backwards from base, then rising again at junction with dorsum . . . 45

45 (44) Pronotum with length very nearly four times height (Text-fig. 9) ***consanguinea*** Stål (p. 410)

– Pronotum with length not more than three and a quarter times height . 46

46 (45) Ocelli small, indistinct (Text-fig. 120). Pubescence on head long. Tegmen with apical limbus narrow (Text-fig. 62) . . . . ***simillima*** Stål (p. 417)

– Ocelli large, prominent (Text-fig. 82). Pubescence on head short. Tegmen with apical limbus broad (Text-fig. 11) . . . ***funkhouseri*** Haviland (p. 404)

47 (43) Metopidium in lateral profile arising straight from base, vertical or inclined slightly forwards 48

– Metopidium in lateral profile curving smoothly backwards from base . . 53

48 (47) Pronotum with length more than three times height (Text-fig. 59) ***depressa*** sp. n. (p. 402)

– Pronotum with length less than three times height 49

49 (48) Tegmen with basal area of subcostal cell coriaceous and punctate for less than half length of cell 50

– Tegmen with basal area of subcostal cell coriaceous and punctate for more than three-quarters length of cell 51

50 (49) Metopidium with width equal to height (Text-fig. 88). Tegmen with apical limbus unpigmented . . . . . ***vicina*** sp. n. (p. 387)

– Metopidium with width one and a third times height (Text-fig. 131). Tegmen with apical limbus pale greyish hyaline . . . ***finitima*** sp. n. (p. 388)

51 (49) Sides of pronotum with three shallow, indistinct indentations (Text-fig. 57) [best observed with light source at acute angle to surface] ***evexa*** sp. n. (p. 396)

– Sides of pronotum smooth 52

52 (51) Pronotal length in excess of 4·5 mm. Ocelli below centro-ocular line (Text-fig. 121) . . . . . ***obscura*** sp. n. (p. 365)

– Pronotal length distinctly less than 4·5 mm. Ocelli on centro-ocular line (Text-fig. 125) . . . . . ***compacta*** Walker (p. 409)

53 (47) Sides of pronotum with shallow, sometimes rather indistinct, indentations (Text-fig. 8) 54

– Sides of pronotum smooth 64

54 (53) Tegmen with pigmentation on coriaceous areas only 58

– Tegmen with pigmentation not restricted to coriaceous areas . . . 55

55 (54) Exposed part of tegmen with a pale pigmented band transversely from costal margin near posterior end of subcostal cell; apical limbus unpigmented . 56

– Exposed part of tegmen without central transverse band; apical limbus pigmented 57

56 (55) Subcostal cell heavily coriaceous and punctate for five-sixths its length (Text-fig. 61) . . . . . ***discreta*** sp. n. (p. 418)

– Subcostal cell indistinctly coriaceous and punctate for basal three-quarters its length (Text-fig. 49) . . . . . ***dama*** sp. n. (p. 368)

57 (55) Pronotal length distinctly greater than 5·0 mm. Metopidium with width less than one and a half times height (Text-fig. 89) . . . ***fallax*** Stål (p. 415)

– Pronotal length less than 5·0 mm. Metopidium with width more than one and a half times height (Text-fig. 128) . . . . ***sulphurea*** sp. n. (p. 412)

58 (54) Posterior apex of pronotum rounded in lateral profile (Text-fig. 13) ***arquata*** sp. n. (p. 412)

– Posterior apex of pronotum acute in lateral profile 59

59 (58) Pronotal length less than 3·3 mm; or, if larger, with fifth apical cell of tegmen relatively well exposed 60

– Pronotal length greater than 3·8 mm; fifth apical cell of tegmen usually completely concealed 61

60 (59) Pronotal length less than 3·3 mm. Metopidium with width one and a half times height . . . . . ***reclusa*** sp. n. (p. 394)

– Pronotal length greater than 3·5 mm. Metopidium with width less than one and one half times height (Text-fig. 123) . . . . ***evexa*** sp. n. (p. 396)

61 (59) Metopidium with width one and a half times height. Head with width dis-

tinctly more than twice length (Text-fig. 81). Pronotal length greater than 4·75 mm. . . . . **affinis** sp. n. (p. 397)

– Metopidium with width less than one and a half times height. Head with width not more than twice length. Pronotal length less than 4·25 mm. . 62

62 (61) Pronotum with length approximately two and a half times height (Text-fig. 68), length less than 3·75 mm. . . . . **melina** sp. n. (p. 401)

– Pronotum with length approximately three times height, length more than 4·0 mm. 63

63 (62) Tegmen with basal two-thirds of subcostal cell coriaceous and punctate, basal third densely so (Text-fig. 12). Paraguay . . . **inornata** sp. n. (p. 404)

– Tegmen with basal five-sixths of subcostal cell very weakly coriaceous and punctate (Text-fig. 63). Peru . . . . . . **gregaria** sp. n. (p. 403)

64 (53) Tegmen, except coriaceous areas, unpigmented 66

– Tegmen with distinct dark markings 65

65 (64) Exposed part of tegmen with a brown transverse band immediately anterior to apical limbus. Posterior apex of pronotum rounded in lateral aspect (Text-fig. 52) . . . . **minuta** Funkhouser (p. 375)

– Exposed part of tegmen with a dark brown transverse band basally and another apically which includes apical limbus. Posterior apex of pronotum acute in lateral aspect (Text-fig. 22) . . . . . **froeschneri** sp. n. (p. 385)

66 (64) Pronotal length greater than 5·0 mm. Posterior apex of pronotum reaching tips of tegmina (Text-fig. 67) . . . . **inconspicua** sp. n. (p. 389)

– Pronotal length not greater than 4·0 mm. Posterior apex of pronotum usually not reaching tips of tegmina 67

67 (66) Ocelli extremely large (Text-fig. 127). Posterior apex of pronotum terminating well before tips of tegmina (Text-fig. 46) . . **deplumis** sp. n. (p. 373)

– Ocelli not unusually large (Text-fig. 110). Posterior apex of pronotum reaching or nearly reaching tips of tegmina 68

68 (67) Tegmen with basal areas of basal and sub-basal cells coriaceous and punctate, pale yellowish (Text-fig. 42). U.S.A. . . . . **lycioda** Ball (p. 419)

– Tegmen with basal areas not as above. South America 69

69 (68) Head with width slightly more than twice length. Tegmen with apical limbus very narrow, second discoidal cell slightly smaller than second apical cell (Text-fig. 66) . . . . **triviale** sp. n. (p. 384)

– Head with width less than twice length. Tegmen with apical limbus broad, second discoidal cell very much larger than second apical cell (Text-fig. 65) **singularis** sp. n. (p. 391)

KEY TO SPECIES OF *AMASTRIS*

(Based on male genitalia)

It has not been possible to examine males of the following species, which are therefore omitted from this key: *arquata*, *compacta*, *consanguinea*, *discreta*, *fallax*, *elevata*, *panamensis*, *peruviana*, *projecta*, *revelata*, *sabulosa*, *simillima*, *straminea* and *sulphurea*.

1 Aedeagus U-shaped, shaft vertical 2

– Aedeagus not U-shaped, shaft horizontal 50

2 (1) Aedeagus with shaft not greatly expanded subapically. Paramere simple . 3

– Shaft of aedeagus with very pronounced expansion subapically (Text-fig. 261). Paramere with large flap-like membrane on distal process (Text-fig. 313) **dissimilis** sp. n. (p. 364)

3 (2) Shaft with subapical spines on anterior and/or lateral surfaces; gonopore subapical on posterior surface . . . 5

– Shaft without spines on anterior surface, if present on lateral surfaces then very small; gonopore apical . . . 4

4 (3) Shaft with a few scattered spines along length of posterior surface; without basal processes (Text-fig. 207) . . . ***obtegens*** Fabricius (p. 365)

– Shaft with numerous very small spines on lateral surfaces; with a distinct process arising near base on each side of posterior surface (Text-fig. 209) . 49

5 (3) Shaft with from two to six spines subapically on anterior surface . . 6

– Shaft with more than six spines subapically on anterior surface . . . 9

6 (5) Shaft with four or six spines subapically on anterior surface . . . 7

– Shaft with two spines on anterior surface, or a single spine on each lateral surface . . . 8

7 (6) Shaft with four very large spines subapically (Text-fig. 213). Paramere with basal process tapering . . . ***knighti*** sp. n. (p. 372)

– Shaft with six spines subapically (Text-fig. 215). Paramere with basal process spatulate . . . ***deplumis*** sp. n. (p. 373)

8 (6) Shaft with two very large subapical spines on anterior surface (Text-fig. 214) ***unica*** sp. n. (p. 374)

– Shaft with a single subapical spine on each lateral surface (Text-fig. 217) ***minuta*** Funkhouser (p. 375)

9 (5) Shaft with two vertical rows of spines on subapical half of anterior surface separated by a narrow flap-like membrane (Text-fig. 219) ***fasciata*** sp. n. (p. 375)

– Shaft not as above, without membrane . . . 10

10 (9) Shaft with spines arranged in a circle subapically on anterior surface; two of them very acutely pointed (Text-figs 223, 274) . . ***lycioda*** Ball (p. 419)

– Shaft with spines not as above . . . 11

11 (10) Shaft with a single row of spines subapically on anterior surface (Text-fig. 279) . 12

– Shaft with more than a single row of spines, or a dense cluster of spines subapically on anterior surface (Text-figs 289, 293) . . . 16

12 (11) Shaft with spines large, few in number (Text-fig. 224) . . . 13

– Shaft with spines very small, numerous (Text-fig. 221). ***inclinata*** sp. n. (p. 379)

13 (12) Shaft with spines extending basad for more than half length of anterior surface (Text-fig. 278) . . . ***exigua*** sp. n. (p. 379)

– Shaft with spines extending basad for much less than half length of anterior surface (Text-fig. 224) . . . 14

14 (13) Shaft in posterior aspect approximately parallel-sided, not expanded apically (Text-fig. 279) . . . ***subangulata*** sp. n. (p. 378)

– Shaft in posterior aspect constricted at midlength, expanded apically (Text-fig. 278) . . . 15

15 (14) Shaft with less than ten subapical spines (Text-fig. 275). Paramere with basal process becoming gradually expanded towards truncate apex (Text-fig. 324) ***brunneipennis*** Funkhouser (p. 380)

– Shaft with approximately fifteen subapical spines (Text-fig. 278). Paramere with basal process broadly spatulate (Text-fig. 331) . ***exaltata*** Walker (p. 376)

16 (11) Aedeagus with a double row of spines subapically across anterior surface of shaft . . . 17

– Aedeagus with spines either in three rows or in a dense cluster. . . . 25

17 (16) Shaft with spines extending basad for more than half length of anterior surface 18

– Shaft with spines extending basad for distinctly less than half length of anterior surface . . . 19

18 (17) Shaft expanded apically in lateral aspect; spines on anterolateral surfaces, irregularly spaced, extending basad for slightly more than half length of anterior surface (Text-fig. 226) . . . ***robusta*** sp. n. (p. 381)

– Shaft not expanded apically; spines on posterolateral surfaces, regularly spaced, extending basad for three-quarters length of anterior surface (Text-fig. 227) ***fonsecai*** sp. n. (p. 382)

19 (17) Spines on shaft extending basad for less than one-quarter length of anterior surface (Text-fig. 230) 20

– Spines on shaft extending basad for more than one-third length of anterior surface 22

20 (19) Paramere with basal process tapering; distal process acutely pointed (Text-fig. 332) 21

– Paramere with basal process approximately parallel-sided, apex truncate; distal process blunt (Text-fig. 350) . . . . ***alapigmentata*** sp. n. (p. 383)

21 (20) Paramere with approximately eight spines on distal process; apex of basal process angled dorsally (Text-fig. 332) . . . . . ***triviale*** sp. n. (p. 384)

– Paramere with approximately sixteen spines on distal process; basal process straight (Text-fig. 334) . . . . . . ***punctata*** sp. n. (p. 384)

22 (19) Shaft of aedeagus with subical spines blunt, few in number (Text-fig. 231) . 23

– Shaft with subapical spines acutely pointed, numerous (Text-fig. 229) . . 24

23 (22) Paramere with basal process tapering towards apex; spines on distal process short (Text-fig. 336) . . . . . . ***froeschneri*** sp. n. (p. 385)

– Paramere with basal process spatulate; spines on distal process long (Text-fig. 339) . . . . ***angulata*** sp. n. (p. 386)

24 (22) Shaft in posterior aspect with length six times maximum breadth; gonopore small (Text-fig. 287). Basal apodeme with length nearly three times maximum width (Text-fig. 229) . . . . . . ***vicina*** sp. n. (p. 387)

– Shaft in posterior aspect with length four times maximum breadth; gonopore large (Text-fig. 288). Basal apodeme with length not more than twice maximum width (Text-fig. 234) . . . . . ***finitima*** sp. n. (p. 388)

25 (16) Aedeagus with spines on shaft arranged in three distinct transverse rows on anterior surface (Text-fig. 289) 26

– Aedeagus with spines on shaft arranged in a dense cluster on anterior surface (Text-fig. 293) 27

26 (25) Aedeagus in lateral aspect with apodeme much broader basally than base of shaft (Text-fig. 235). Paramere with recurved apex of distal process as long as broad (Text-fig. 345) . . . . . ***pseudoelevata*** sp. n. (p. 388)

– Aedeagus in lateral aspect with apodeme no broader basally than base of shaft (Text-fig. 236). Paramere with recurved apex of distal process broader than long (Text-fig. 347) . . . . . . ***inconspicua*** sp. n. (p. 389)

27 (25) Shaft with spines extending basad for more than two-thirds length of anterior surface 28

– Shaft with spines extending basad for less than two-thirds length of anterior surface 29

28 (27) Shaft in lateral aspect approximately one-sixth width of basal apodeme; slightly curved anteriorly at apex. Basal apodeme massive (Text-fig. 237) ***obscura*** sp. n. (p. 390)

– Shaft in lateral aspect more than one-third maximum width of basal apodeme; straight. Basal apodeme not unusually large (Text-fig. 238) ***singularis*** sp. n. (p. 391)

29 (27) Spines on shaft extending basad for less than half length of anterior surface . 30

– Spines on shaft extending basad for at least half length of anterior surface . 41

30 (29) Shaft with spines extending basad for less than one-fifth length of anterior surface (Text-fig. 240) 31

– Shaft with spines extending basad for at least one-quarter length of anterior surface (Text-fig. 242) 32

31 (30) Aedeagus with shaft as long as basal apodeme. Paramere with dorsal exten-

sion of distal process three times as long as maximum width (Text-fig. 354) ***undulata*** sp. n. (p. 392)

– Aedeagus with shaft longer than basal apodeme. Paramere with dorsal extension of distal process less than twice as long as maximum width (Text-fig. 338) ***viridisparsa*** sp. n. (p. 392)

32 (30) Shaft with spines extending basad of lower margin of gonopore (Text-fig. 243) 33

– Shaft with spines not extending basad of lower margin of gonopore (Text-fig. 248) 37

33 (32) Shaft in lateral aspect more than half maximum width of basal apodeme (Text-fig. 241) . . . . ***reclusa*** sp. n. (p. 394)

– Shaft in lateral aspect less than half maximum width of basal apodeme . 34

34 (33) Shaft curving anteriorly, apex converging with basal apodeme (Text-fig. 243) ***evexa*** sp. n. (p. 396)

– Shaft and basal apodeme parallel or diverging 35

35 (34) Shaft distinctly longer than basal apodeme (Text-fig. 242) . ***flava*** sp. n. (p. 393)

– Shaft not longer than basal apodeme 36

36 (35) Shaft with spines extending basad for more than one-third length of anterior surface; maximum width of basal apodeme in lateral aspect four times that of shaft (Text-fig. 250) . . . . ***specialis*** sp. n. (p. 400)

– Shaft with spines extending basad for less than one-third length of anterior surface; maximum width of basal apodeme in lateral aspect approximately three times that of shaft (Text-fig. 251) . . . . . ***melina*** sp. n. (p. 401)

37 (32) Shaft distinctly longer than basal apodeme (Text-fig. 245) ***guttata*** Fonseca (p. 395)

– Shaft not longer than basal apodeme 38

38 (37) Shaft in lateral aspect half maximum width of basal apodeme (Text-fig. 247) ***pseudomaculata*** sp. n. (p. 399)

– Shaft in lateral aspect more than half maximum width of basal apodeme . 39

39 (38) Paramere with basal process expanded, spatulate (Text-fig. 344) ***conspicua*** sp. n. (p. 398)

– Paramere with basal process approximately parallel-sided 40

40 (39) Aedeagus with dorsal apex of basal apodeme inclined anteriorly (Text-fig. 244) ***affinis*** sp. n. (p. 397)

– Aedeagus with dorsal apex of basal apodeme not inclined anteriorly (Text-fig. 248) . . . . ***notata*** sp. n. (p. 398)

41 (29) Aedeagus in lateral aspect with shaft approximately as broad as basal apodeme 42

– Aedeagus in lateral aspect with shaft distinctly narrower than basal apodeme 43

42 (41) Aedeagus with shaft longer than basal apodeme; approximately parallel-sided in posterior aspect (Text-fig. 311). South America . ***depressa*** sp. n. (p. 402)

– Aedeagus with shaft not longer than basal apodeme; constricted subapically in posterior aspect (Text-fig. 307). U.S.A. . . . . ***templa*** Ball (p. 420)

43 (41) Paramere with basal process very slender basally, becoming much expanded towards apex (Text-fig. 364) . . . . ***funkhouseri*** Haviland (p. 404)

– Paramere with basal process either parallel-sided or tapering from base to apex 44

44 (43) Basal process of paramere tapering, apex acutely pointed (Text-fig. 351) ***janae*** sp. n. (p. 405)

– Basal process of paramere approximately parallel-sided, apex rounded . . 45

45 (44) Aedeagus with shaft distinctly longer than basal apodeme 46

– Aedeagus with shaft not longer than basal apodeme 47

46 (45) Distal process of paramere with more than twelve spines (Text-fig. 365) ***inermis*** sp. n. (p. 407)

– Distal process of paramere with less than ten spines (Text-fig. 348) ***sakakibarai*** sp. n. (p. 408)

47 (45) Paramere with basal process twice length of distal process (Text-fig. 359) . 48

– Paramere with basal process less than twice length of distal process (Text-fig. 360) . . . . ***maculata*** Funkhouser (p. 406)

48 (47) Basal process of paramere approximately straight, apex obtusely rounded (Text-fig. 363) . . . . ***gregaria*** sp. n. (p. 403)

– Basal process of paramere sinuate, apex obliquely angled (Text-fig. 359) ***inornata*** sp. n. (p. 404)

49 (4) Aedeagus with basal apodeme almost parallel-sided, six times as long as maximum breadth; lateral processes on shaft vertical, more than five times longer than wide (Text-fig. 208) . . . . ***concolor*** sp. n. (p. 366)

– Aedeagus with basal apodeme expanded at midlength, less than three times as long as maximum breadth; lateral processes on shaft curving posteriorly, as broad as long (Text-fig. 209) . . . . . . ***vitallina*** sp. n. (p. 367)

50 (1) Shaft with a pair of lateral processes subapically 51

– Shaft with two pairs of lateral processes, one apically and the other subapically (Text-fig. 211) . . . . ***dama*** sp. n. (p. 368)

51 (50) Shaft with a pair of bifid, heavily chitinized lateral processes subapically, without spines 52

– Shaft with a pair of blunt, non-bifurcate processes apically, with numerous small spines 53

52 (51) Shaft with scattered small spines subapically on dorsal surface; basal apodeme less than half length of shaft (Text-fig. 210) . . . . ***ramosa*** sp. n. (p. 369)

– Shaft with dorsal surface smooth; basal apodeme distinctly more than half length of shaft (Text-fig. 212) . . . . . ***interstincta*** sp. n. (p. 369)

53 (51) Shaft with spines on posteroventral surfaces of apical processes only; basal apodeme six times as long as maximum breadth (Text-fig. 216) ***flavifolia*** Funkhouser (p. 370)

– Shaft with spines on both posteroventral and anteroventral surfaces of apical processes; basal apodeme nearly twice as broad as long (Text-fig. 218) ***vismiae*** Haviland (p. 371)

DESCRIPTIONS OF THE SPECIES

Amastris dissimilis sp. n.

(Text-figs 43, 104, 174, 206, 261, 313)

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·9 mm, length of pronotum 3·9 mm, maximum height of pronotum 1·4 mm, length of tegmen 3·3 mm. Female: slightly larger than male, length of pronotum 4·2 mm, maximum height of pronotum 1·6 mm.

Head with vertex indistinctly ridged and punctate; medial groove indistinct. Ocelli prominent, very much closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for less than one-third its length beyond lower margins of vertex; basal and lateral margins indistinct. Rostrum reaching to hind coxae.

Pronotum nearly three times as long as high; sides shallowly and obscurely indented immediately posterior to humeral angles, centrally, and in posterior third; posterior apex acute, not reaching tips of tegmina. Metopidium wider than high, regularly curved posteriorly from base to smooth junction with dorsum; median carina obscure basally, becoming prominent towards dorsum. Dorsum with maximum height at approximately one-quarter its length posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell slightly larger than first apical cell, distinctly larger than each of second, third, and fourth apicals, not reaching costal margin; fifth apical cell not entirely concealed by pronotum; subcostal cell weakly coriaceous and sparsely punctate over basal two-fifths; apical limbus broad; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmen, dull, pale greenish yellow, median carina on dorsum very narrowly edged with black; cells of tegmen clear hyaline; exposed part of apical limbus dark brown.

Male genitalia with aedeagus U-shaped; shaft directed vertically, longer than basal apodeme, strongly expanded laterally near apex in posterior aspect; with a row of very large, ventrally directed, heavily chitinized spines on margins of expansion; gonopore very large, situated subapically on posterior surface; basal apodeme basally much narrower than shaft in lateral aspect, broader centrally, apex tapering. Paramere with distal process one-third total length; approximately seven short spines on dorsal surface and four similar spines apically; a large dorsal membrane extending from immediately anterior to apex to medial apodeme; basal process narrow basally, greatly expanded towards very obtusely rounded apex.

Immediately distinguished from the other species of the genus by the unique structure of aedeagus and paramere.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Mato Grosso, gallery forest, 12°49′ S 51°45′ W, 2.i.1969 (*Knight*) (BMNH).

Paratype. BRAZIL: 1 ♀, data as holotype (BMNH).

Type-series collected on Royal Society / Royal Geographical Society Xavantina / Cachimbo Expedition 1967–69.

Amastris obtegens (Fabricius)

(Text-figs 26, 95, 207, 262, 316)

Membracis obtegens Fabricius, 1803 : 25. Holotype ♂, locality not known (UZM, Copenhagen) [examined].

Thelia obtegens (Fabricius) Walker, 1851 : 563.

Amastris obtegens (Fabricius) Stål, 1869 : 25.

Length of pronotum: male 4·8–6·0 mm, female 4·9–6·0 mm; maximum height of pronotum: male 2·2–2·7 mm, female 2·2–2·8 mm.

Male: width of vertex excluding eyes 1·4 mm, width of vertex including eyes 2·3 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·8 mm, length of pronotum 6·0 mm, maximum height of pronotum 2·7 mm, length of tegmen 4·5 mm. Female: very slightly larger than male, proportionately similar.

Head with vertex very obscurely punctate, finely and indistinctly ridged; medial groove distinct basally, becoming obscure at level of ocelli. Ocelli prominent, slightly closer to the eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-sixth its length beyond lower margins of vertex, lateral margins distinct. Rostrum reaching to hind coxae.

Pronotum slightly more than twice as long as high, sides without indentations; posterior apex acute, nearly reaching tips of tegmina. Metopidium nearly as high as wide, inclined forwards from base, then curving smoothly to junction with dorsum; median carina indistinct basally, becoming highly elevated towards junction with dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell approximately as large as each of first and second apical cells, not reaching to costal margin; third apical cell very small; fifth almost completely hidden by side of pronotum; subcostal cell coriaceous and punctate over basal four-fifths; veins distinct.

Head and pronotum pale yellowish brown, dull, unmarked, median carina very narrowly edged with black; ventral surfaces of vertex, abdomen, legs, and most of exposed part of tegmen dark brown, almost black; basal cell of tegmen pale hyaline, adjacent veins and internal angle of coriaceous part of anal area concolorous with pronotum.

Male genitalia with aedeagus U-shaped; shaft directed vertically, much shorter than basal apodeme; robust in lateral aspect, nearly as broad as basal apodeme, very slender in posterior aspect; a double row of irregularly spaced decurved spines running almost whole length of posterior surface of shaft, approximately eight spines in each row, those in basal half of shaft very large; gonopore small, apical. Paramere with distal process approximately one half total length; a few short spines on lateral surfaces; more numerous and much longer spines on dorsal surface; basal process almost parallel-sided, apex acute.

This species is distinguished by the highly elevated pronotum, the dense pigmentation of the tegmen, and the unique arrangement of the spines on the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, locality unknown, collector unknown (UZM, Copenhagen).

GUYANA: 5 ♂, 14 ♀, Kartabo, vii.1922 (*Haviland*) (BMNH); 1 ♀, N.W. District, Wanaina, iii.1931 (*Myers*) (BMNH).

This species is also recorded from Mexico, Panama, Brazil, Colombia, Costa Rica, Ecuador, and Peru (Metcalf, 1965 : 875). It has frequently been confused with *elevata* and others, and the validity of previous records is consequently doubtful.

***Amastris concolor* sp. n.**

(Text-figs 32, 92, 167, 208, 263, 318)

Length of pronotum: male 5·0–5·5 mm, female 5·2–5·2 mm; maximum height of pronotum: male 2·2–2·4 mm; female 2·2–2·4 mm.

Male: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 2·0 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·2 mm, length of pronotum 5·5 mm, maximum height of pronotum 2·4 mm, length of tegmen 4·1 mm. Female: slightly larger than male, dorsum somewhat more elevated.

Head with vertex almost flat, finely wrinkled and obscurely punctate, medial groove indistinct. Ocelli small, inconspicuous, slightly nearer to eyes than to each other, situated well below centro-ocular line. Frontoclypeus extending for one-fifth its length beyond lower margins of vertex, basal and lateral margins indistinct. Rostrum reaching hind coxae.

Pronotum slightly more than twice as long as high, sides without indentations, posterior apex reaching to near tips of tegmina. Metopidium nearly as high as wide, inclined forwards from base, then curving posteriorly to smooth junction with dorsum; median carina low near base, becoming more prominent towards dorsum. Dorsum with maximum height between humeral angles and mid-length; median carina very highly elevated, keel-like.

Tegmen with second discoidal cell approximately as large as each of first and second apical cells, not reaching to costal margin; third apical cell small; fifth apical completely concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal four-fifths; veins not prominent.

Head, pronotum, lateral and dorsal surfaces of abdomen, and coriaceous areas and veins of tegmen pale brownish yellow; ocelli concolorous with vertex; lateral margins of vertex between ocelli and eyes sometimes mottled reddish brown; median carina on dorsum narrowly edged with black; legs pale brown basally, becoming darker towards apices of tibiae, tarsi pale, claws darker.

Male genitalia with aedeagus slender, U-shaped; shaft curving slightly posteriorly, much shorter than basal apodeme; two small lateral expansions subapically; numerous small spines laterally at mid length; a long, slender, vertically directed process arising near base on each postero-lateral surface; gonopore small, situated apically on posterior surface; basal apodeme six times as long as its maximum width. Paramere robust; distal process almost half total length; eight large spines on dorsal and posterior surfaces; basal process slender, almost parallel-sided, apex acute.

A relatively large species with the pronotum highly elevated. It is distinguished by the very unusual form of the aedeagus which sets it, and the closely related *vitallina*, apart from the other species of the genus.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: São Paulo, Pargue, Jabaguera, ix.1931 (*Fonseca*) (MZUSP, São Paulo).

Paratypes. BRAZIL: 1 ♀, Pará, Maué, iv.1940 (*Fonseca*) (MZUSP); 1 ♀, Pará, Obidos, 1940 (*Fonseca*) (BMNH); 1 ♂, Nova Teutonia, 1939 (*Plauman*) (BMNH).

***Amastris vitallina* sp. n.**

(Text-figs 24, 85, 159, 209, 264, 320)

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·9 mm, length of pronotum 4·6 mm, maximum height of pronotum 1·8 mm, length of tegmen 3·7 mm. Female: very similar to male, length of pronotum 4·5 mm, maximum height of pronotum, 1·8 mm.

Head with vertex very obscurely and irregularly ridged and punctate; medial groove becoming indistinct at level of ocelli. Ocelli prominent, slightly closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-quarter its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching hind coxae.

Pronotum with length two and a half times maximum height, without lateral indentations; posterior apex acute, reaching to near tips of tegmina. Metopidium one and a half times as wide as high, slightly inclined forwards from base then curving posteriorly to smooth junction with dorsum; medial carina becoming highly elevated between midlength and junction with dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to third apical cell, smaller than each of first and second apicals, not reaching costal margin; fifth apical cell not completely covered by pronotum; subcostal cell coriaceous and densely punctate over basal three-quarters; apical limbus relatively narrow; veins narrow, distinct.

Head, pronotum, ventral surfaces of thorax, legs, abdomen, veins and coriaceous areas of tegmen yellowish brown, unmarked; median carina on dorsum broadly edged with black; cells of tegmen clear hyaline; apical limbus narrowly edged with dark brown; apices of fore and middle tibiae and tarsal claws brown.

Male genitalia with aedeagus complex, U-shaped; shaft directed vertically, distinctly shorter than basal apodeme, very slender, curving slightly posteriorly; a pair of short, blunt, posteriorly directed basal processes; two small lateral projections subapically; numerous very small blunt spines over apical half of posterolateral surfaces; gonopore very small, apical. Paramere very large, robust; distal process only one-quarter total length; eleven long spines subapically on dorsal and posterior surfaces; basal process massive, expanding gradually from base to very obtusely rounded, spatulate apex.

This species is distinguished by the very distinctive male genitalia. It is closely related to *concolor*, and quite distinct from all other species of the genus.

MATERIAL EXAMINED.

Holotype ♂, FRENCH GUIANA: Guyane, Maroni (*Le Moult*) (NSCU, Raleigh).
Paratype. FRENCH GUIANA: 1 ♀, data as holotype (BMNH).

Amastris dama sp. n.

(Text-figs 49, 122, 182, 211, 265, 315)

Length of pronotum: male 3·2–3·4 mm, female 3·4–3·8 mm; maximum height of pronotum: male 1·1–1·2 mm, female 1·2–1·4 mm.

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·9 mm, length of pronotum 3·4 mm, maximum height of pronotum 1·2 mm, length of tegmen 3·4 mm. Female: slightly larger than male, proportionately similar.

Head with vertex distinctly punctate; medial groove distinct throughout its length. Ocelli small, prominent, one and a half times as far from each other as from eyes, situated well below centro-ocular line. Frontoclypeus extending for almost half its length beyond lower margins of vertex, basal and lateral margins distinct. Rostrum reaching beyond hind coxae.

Pronotum three and a third times as long as high; sides shallowly indented centrally and immediately posterior to level of humeral angles; posterior apex acute, terminating well before tips of tegmina. Metopidium twice as wide as high, curving posteriorly from base to smooth junction with dorsum; median carina low, distinct, becoming highly elevated near junction with dorsum. Dorsum with maximum height at one-fifth distance from metopidium to apex; median carina keel-like.

Tegmen with second discoidal cell approximately as large as first apical cell, not reaching costal margin; second apical cell slightly larger; fifth apical not completely concealed by pronotum; subcostal cell weakly coriaceous and sparsely punctate over basal three-quarters; apical limbus broad; veins distinct.

Head, pronotum, ventral surface of thorax, legs, and coriaceous areas of tegmen pale yellowish brown; pronotum with an indistinct area centrally and a transverse band subapically paler; abdomen pale pink; ocelli, base of head, and base of metopidium often deep pink; veins of tegmen frequently unpigmented; cells and limbus unpigmented.

Male genitalia with aedeagus complex; shaft horizontal, posteriorly directed; two long, dorsally directed, coarsely serrate processes apically; two long, anteroventrally directed processes subapically on ventral surface converging medially; numerous, very small spines basally on dorsal surface; gonopore apical, between bases of apical processes. Basal apodeme greatly reduced, vertical. Paramere with distal process almost half total length, much broader than basal process; apex narrowly recurved; approximately seven short spines on dorsal surface arising from a subapical flap-like membrane; two much longer spines on posterior surface; basal process very slender, almost parallel-sided, apex acute.

This species is distinguished by the unique form of the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Mato Grosso, gallery forest, 12°49′ S – 51°45′ W, 9.i.1969 (*Knight*) (BMNH).

Paratypes. BRAZIL: 2 ♂, 12 ♀, data as holotype (BMNH).

The type-series was collected on the Royal Society / Royal Geographical Society Xavantina / Cachimbo Expedition 1967–69.

Amastris ramosa sp. n.

(Text-figs 35, 96, 190, 210, 266, 321)

Length of pronotum: male 4·4–4·8 mm, female 4·5–4·7 mm; maximum height of pronotum: male 1·9–2·1 mm, female 1·9–2·2 mm.

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·9 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·2 mm, length of pronotum 4·8 mm, maximum height of pronotum 1·9 mm, length of tegmen 3·8 mm. Female: similar to male in size and proportions.

Head with vertex almost flat, very finely ridged, punctation obscure; medial groove distinct basally, becoming obsolete towards junction with frontoclypeus. Ocelli distinct, slightly nearer to the eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for a quarter its length beyond lower margins of vertex; lateral margins distinct, becoming obscure towards base. Rostrum reaching to hind coxae.

Pronotum two and a half times as wide as long, sides without indentations, reaching tips of tegmina. Metopidium a little wider than high, slightly inclined forward from base, then curving posteriorly to smooth junction with dorsum; median carina arising near base, highly elevated from midlength to dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell as large as first apical, not reaching to costal margin; second and third apical cells smaller; fifth apical completely concealed by pronotum; subcostal cell coriaceous and punctate over basal three-quarters; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, veins and coriaceous area of tegmen pale brownish yellow, unmarked; ocelli shining, yellow; median carina of pronotum narrowly edged with black; tegmen with apical limbus, third apical cell and posterior part of fourth apical pale brownish hyaline, rest of tegmen unpigmented.

Male genitalia with aedeagus robust; shaft horizontal; a pair of laterally directed bifid processes subapically; a row of small, lightly chitinized, spines subapically on dorsal surface; gonopore apical on posteroventral surface. Paramere with distal process approximately half total length; approximately twelve spines on dorsal and posterior surfaces; basal process broad, almost-parallel sided, apex rounded.

This species, externally very similar to *vismiae*, is most easily distinguished from that species by the structure of the aedeagus. On genitalic characters it is most closely related to *interstincta*, from which it may be distinguished by the more highly elevated pronotum.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Para, Belem, iv.1954 (*Fonseca*) (MZUSP).

Paratypes. BRAZIL: 1 ♂, 6 ♀, data as holotype (MZUSP); 1 ♂, 4 ♀, data as holotype (BMNH). VENEZUELA: 1 ♂, Mt Duida, 6.iii.1929 (AMNH, New York.)

Amastris interstincta sp. n.

(Text-figs 56, 119, 200, 212, 268, 323)

Length of pronotum: male 4·2–4·6 mm; maximum height of pronotum 1·6–1·7 mm.

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·9 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·2 mm, length of pronotum 4·6 mm, maximum height of pronotum 1·7 mm, length of tegmen 3·7 mm.

Female unknown.

Head with vertex finely ridged, irregularly and obscurely punctate; medial groove obsolete. Ocelli prominent, slightly closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-fifth its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching hind coxae.

Pronotum with length more than two and one half times maximum height; without lateral indentations; posterior apex acute, reaching to near tips of tegmina. Metopidium one and a half times as wide as high, rising vertically from base, then curving posteriorly to smooth junction with dorsum; median carina gradually becoming elevated towards dorsum. Dorsum with maximum height at one-sixth distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to first apical cell, slightly larger than second apical, much larger than third apical, not reaching costal margin; fourth apical cell partially covered by pronotum; fifth apical entirely concealed; subcostal cell heavily coriaceous and densely punctate over basal four-fifths; apical limbus broad; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmen, pale yellowish brown, unmarked; median carina of dorsum brown, narrowly edged with black; ocelli very narrowly edged with bright scarlet; cells of tegmen clear hyaline, unmarked; exposed part of apical limbus pale brownish hyaline; tarsal claws dark brown.

Male genitalia with aedeagus complex; shaft horizontal; a bifid, heavily chitinized, anteriorly directed, subapical process on each lateral surface; spines absent; gonopore subapical on ventral surface; basal apodeme vertical, length slightly greater than maximum width. Paramere with distal process slightly greater than one-third total length; approximately twelve spines on lateral and dorsal surfaces; basal process very robust, spatulate, obtusely rounded apically.

This species is closely related to *ramosa*, but is distinguished by the structure of the paramere. The form of the aedeagus sets both these species apart from the remainder of the genus.

MATERIAL EXAMINED.

Holotype ♂, GUYANA: Bartica District, Kartabo, 3.vii.1922 (AMNH, New York). Paratype. GUYANA: 1 ♂, data as holotype (BMNH).

Amastris flavifolia Funkhouser

(Text-figs 3, 80, 142, 216, 269, 325)

[Species described but not named] Stoll, 1788 : 61.

Amastris flavifolia Funkhouser, 1927 : 302. LECTOTYPE ♀, SURINAM (RNH, Leiden), here designated [examined].

Male: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 2·1 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·4 mm, length of pronotum 5·3 mm, maximum height of pronotum 2·3 mm, length of tegmen 4·2 mm. Female: equal in size and proportions to male.

Head with vertex very irregularly ridged and punctate; medial groove distinct basally, becoming obscure at level of ocelli. Ocelli large, distinct, closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-quarter its length beyond lower margins of vertex, lateral margins distinct. Rostrum reaching hind coxae.

Pronotum two and a quarter times as long as maximum height, sides without indentations; apex acute, reaching to near tips of tegmina. Metopidium one and a third times as wide as high; straight, slightly inclined forwards from base, then curving posteriorly to smooth junction with dorsum; median carina arising somewhat above base, becoming elevated towards junction with dorsum. Dorsum with maximum height at one-fifth distance posterior to junction with metopidium; median carina highly elevated.

Tegmen with second discoidal cell smaller than each of first and second apical cells, not reaching costal margin; third apical cell smaller; fifth not completely covered by pronotum; subcostal cell very weakly coriaceous and weakly and sparsely punctate over basal half; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmen dull yellowish without markings; cells of tegmen clear hyaline; tarsal claws brown.

Male genitalia with aedeagus complex; shaft vertical near base, then inclined posteriorly; two short, robust, recurved, ventrally directed processes subapically; a row of small, ventrally directed spines on posteroventral surface of each process; three similar spines on exterior-lateral surfaces of each process; gonopore small, situated between bases of apical processes; basal apodeme slender, vertically directed. Paramere with distal process very robust, comprising more than half total length; numerous short spines on lateral and posterior surfaces; five longer spines on dorsal surface; basal process very short, slender.

This species is closely related to *vismiae*, but differs in the rather less elevated pronotum, the very distinctive proportions of the paramere and basal apodeme, and the arrangement of the spines on the shaft of the aedeagus.

The name *flavifolia* has long been credited to Stoll, who first described the species; however, no record of this name has been traced before its appearance in Funkhouser's catalogue (1927 : 302); Stoll himself called the species simply 'Het geele Schermblad'. The two specimens in the type-series, however, bear the name *flavifolia* on Blote's determination labels, but no reference can be found in Blote's published work to his use of this name prior to its appearance in Funkhouser's catalogue. It must therefore be assumed that the name *flavifolia* be accredited to Funkhouser (1927).

MATERIAL EXAMINED.

Lectotype ♀, SURINAM (*Calkoen*) (RNH, Leiden).

Paralectotype. AMERICA (RNH, Leiden) [only the pronotum remains of this specimen]. Both these specimens bear H. C. Blote's determination labels.

BRAZIL: 1 ♂, Assu, xii.1912 (*Matausch*) (AMNH, New York). This specimen bears F. W. Goding's determination label.

Amastris vismiae Haviland

(Text-figs 29, 93, 168, 218, 270, 327)

Amastris vismiae Haviland, 1925 : 252. Lectotype ♀, GUYANA (BMNH) [examined]. (Lectotype designation by Broomfield, 1971 : 385.)

Length of pronotum: male 4·4–4·6 mm, female 4·5–5·5 mm; maximum height of pronotum: male 2·1–2·2 mm, female 1·6–2·7 mm.

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·0 mm, length of pronotum 4·4 mm, maximum height of pronotum 2·1 mm, length of tegmen 3·6 mm. Female: usually larger than males but similar in proportion.

Head with vertex finely wrinkled, very indistinctly punctate; medial groove basally distinct, becoming obscure towards junction with clypeus. Ocelli small, prominent, slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-quarter its length beyond lower margins of vertex, basal margins indistinct. Rostrum extending just beyond hind coxae.

Pronotum with length slightly more than twice maximum height, sides without indentations; apex acute, extending to tips of tegmina. Metopidium as wide as high, inclined forwards from base, then curving posteriorly to smooth junction with dorsum; median carina arising near base, becoming highly elevated near mid length to junction with dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to each of first and second apical cells, not reaching costal margin; third apical cell small; fifth and part of fourth concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal seven-eighths; apical limbus broad; veins narrow, often indistinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmina, pale brownish; median carina often very narrowly edged with black, sides sometimes reddish; veins of tegmen often unpigmented; tarsal claws dark brown; cells of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus complex; shaft directed vertically at base then curving posteriorly; a pair of short, robust, ventrally directed processes subapically; short, ventrally directed heavily chitinized spines on antero- and posteroventral surfaces of processes; two small, weakly-chitinized spines at apex of shaft; gonopore small, between bases of processes; basal apodeme vertical, basal width equal to its length. Paramere with distal process slightly less than half total length, robust; numerous irregularly spaced spines on lateral, dorsal, and posterior surfaces; basal process almost parallel-sided, apex acute, slightly upturned.

This species is closely related to *flavifolia*, but differs in the position of the spines on the subapical processes of the aedeagus, the relative width of the basal apodeme, and the relative length of the basal process of the paramere.

MATERIAL EXAMINED.

Lectotype ♀, GUYANA: Kartabo, viii.1922 (*Haviland*) (BMNH).

Paralectotypes. GUYANA: 3 ♂, 4 ♀ and 2 specimens without abdomens, data as lectotype (BMNH).

Specimens from Brazil have also been examined. The species is recorded from Ecuador (Metcalf, 1965 : 876).

Amastris knighti sp. n.

(Text-figs 55, 117, 201, 213, 271, 322)

Length of pronotum: 4·1–4·2 mm; maximum height of pronotum: 1·4–1·6 mm.

Male: width of vertex excluding eyes 0·9 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·7 mm, length of pronotum 4·1 mm, maximum height of pronotum 1·4 mm, length of tegmen 3·2 mm.

Female unknown.

Head with vertex very finely ridged and indistinctly punctate; medial groove indistinct. Ocelli distinct, slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for slightly more than one-third its length beyond lower margins of vertex; lateral margins distinct. Rostrum reaching to posterior coxae.

Pronotum nearly three times as long as high; sides without indentations; apex acute, not reaching tips of tegmina. Metopidium wider than high, inclined forward from base, then curving posteriorly to smooth junction with dorsum; median carina arising basally, low, distinct, becoming elevated before junction with dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell very much larger than any of first three apical cells, reaching and narrowly occupying costal margin between first and second apicals; fourth apical cell very long and narrow; fifth apical entirely concealed by pronotum; subcostal cell weakly coriaceous over basal quarter, weakly and sparsely punctate over basal three-quarters; apical limbus broad; veins indistinct.

Pronotum, abdomen, coriaceous areas of tegmen, and tarsi pale yellowish; head, ventral surfaces of thorax, coxae and femora, brownish; median carina on dorsum very narrowly edged with black; tegminal cells clear hyaline, without markings; veins very pale yellowish or unpigmented; tibiae and tarsal claws bright scarlet.

Male genitalia with aedeagus U-shaped; shaft slightly longer than basal apodeme, almost as broad as apodeme in lateral aspect, directed vertically; two large anteriorly directed, heavily chitinized spines subapically on each side of anterior surface; gonopore subapical on posterior surface. Paramere with distal process approximately one-third total length, no broader than basal process in lateral aspect; approximately eleven spines irregularly scattered on dorsal, lateral and posterior surfaces; basal process almost parallel-sided; apex upturned, acutely rounded.

This species is not easily identified externally. It is readily distinguished by the arrangement of spines on the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Mato Grosso, 12°50′ S 51°47′ W, at light, 28.x.1968 (*Richards*) (BMNH).

Paratype. BRAZIL: 1 ♂, Mato Grosso, 12°49′ S 51°45′ W, gallery forest, 8.xi.1968 (*Knight*) (BMNH).

Both specimens were collected on the Royal Society / Royal Geographical Society Xavantina / Cachimbo Expedition 1967–69.

Amastris deplumis sp. n.

(Text-figs 46, 127, 173, 215, 260, 317)

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 2·1 mm, length of pronotum 4·0 mm, maximum height of pronotum 1·6 mm, length of tegmen 3·3 mm.

Female unknown.

Head with vertex obscurely punctate; medial groove obscure. Ocelli very large, prominent, closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal and lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length two and a half times maximum height, without lateral indentations; apex acute, not reaching tips of tegmina. Metopidium twice as wide as high, curving posteriorly and dorsally from base to smooth junction with dorsum; median carina increasing in height towards junction with dorsum. Dorsum with maximum height at one-quarter its length from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to each of first and fourth apical cells, distinctly larger than each of second and third apicals, not reaching costal margin; fifth apical cell not completely concealed by pronotum; subcostal cell coriaceous and punctate over basal three-quarters; apical limbus broad; veins distinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, coriaceous areas and veins of tegmen, yellow, unmarked; cells and apical limbus of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft directed vertically, slightly shorter than basal apodeme, as broad as apodeme in lateral aspect; six large closely apposed spines subapically on anterior surface; gonopore subapical on posterior surface. Paramere very slender; distal process slightly less than two-fifths total length; numerous spines of almost uniform length on posterior, lateral, and dorsal surfaces; basal process spatulate apically.

This species is distinguished by the very large ocelli, the lack of dark pigmentation, and the very distinctive form of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BELIZE: Punta Gordes, iv.1935 (*White*) (BMNH).

Amastris unica sp. n.

(Text-figs 21, 134, 158, 214, 272, 326)

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·3 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·7 mm, length of pronotum 4·2 mm, maximum height of pronotum 1·5 mm, length of tegmen 3·5 mm. Female: slightly larger than male, pronotum rather more elevated; length of pronotum 4·3 mm, maximum height of pronotum 1·8 mm.

Head with vertex obscurely and irregularly ridged and punctate; medial groove obsolete. Ocelli very small, obscure, slightly closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal and lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length slightly less than three times maximum height, without lateral indentations; apex acute, reaching to near tips of tegmina. Metopidium with width one and a half times height, slightly inclined forwards from base, then curving posteriorly to smooth junction with dorsum; median carina becoming gradually elevated towards dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell larger than each of first three apical cells, reaching and narrowly occupying costal margin between first and second apicals; fifth apical cell not entirely covered by pronotum; subcostal cell weakly coriaceous and punctate over basal two-thirds; apical limbus broad; veins distinct.

Head, pronotum, lateral surfaces of abdomen, veins and coriaceous areas of tegmen dull yellow, unmarked; median carina of dorsum very narrowly edged with black; ventral surfaces of thorax, coxae, and basal abdominal sternites dark brown; tarsi and bases of femora concolorous with pronotum; apices of femora and tibiae pale crimson; tarsal claws brown; cells and apical limbus of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft as long as basal apodeme, inclined slightly posteriorly, as broad as apodeme in lateral aspect; a large, anteriorly directed spine subapically on each anterolateral surface; gonopore subapical on posterior surface. Paramere very slender; distal process slightly more than one-third total length; a few spines on dorsal, lateral, and posterior surfaces; basal process tapering gradually to acute apex.

This species closely resembles *vitallina* externally, especially the females, but the male genitalia are quite distinct.

MATERIAL EXAMINED.

Holotype ♂, FRENCH GUIANA: Guyane, Maroni (*Le Moult*) (NCSU, Raleigh).
Paratype. FRENCH GUIANA: 1 ♀, data as holotype (NCSU).

Amastris minuta Funkhouser **sp. rev.**

(Text-figs 52, 129, 170, 217, 267, 328)

Amastris minuta Funkhouser, 1922 : 30. Holotype ♂, PERU (USNM, Washington) [examined].

Male: width of vertex excluding eyes 0·9 mm, width of vertex including eyes 1·4 mm, length of vertex to base of clypeus 0·4 mm, width of clypeus 0·4 mm, length of clypeus 0·4 mm, maximum width of pronotum 1·6 mm, length of pronotum 3·2 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·2 mm.

Female unknown.

Head with vertex indistinctly punctate; medial groove distinct basally, becoming obscure towards base of clypeus. Ocelli small, not prominent, nearer to eyes than to each other, situated on or immediately below centro-ocular line. Frontoclypeus extending for less than one quarter its length beyond lower margins of vertex; basal margins indistinct. Rostrum reaching posterior coxae.

Pronotum approximately three times as long as high; sides without indentations; apex rounded in lateral aspect, reaching to near tips of tegmina. Metopidium twice as wide as high, curving posteriorly from base to smooth junction with dorsum; median carina arising near base, distinct, but not highly elevated. Dorsum with maximum height immediately anterior to midlength; median carina not keel-like.

Tegmen with second discoidal cell very large, much larger than first apical cell, reaching costal margin; fourth apical partially covered by pronotum; fifth apical completely concealed; subcostal cell weakly coriaceous and densely punctate over basal three-quarters; veins distinct.

Head, pronotum, abdomen, ventral surfaces of thorax, majority of veins and coriaceous areas of tegmen, and legs pale yellowish brown, unmarked; cells of tegmen clear hyaline with dark brown transverse band across second and fourth apical cells and impinging slightly upon first discoidal and third apical cell, veins within this area brown.

Male genitalia with aedeagus U-shaped; shaft vertical, as long as and nearly as broad as basal apodeme in lateral aspect, slender in posterior aspect; a single large, blunt spine subapically on each side; gonopore subapical on posterior surface. Paramere with distal process nearly half total length; approximately eight long spines on lateral and posterior surfaces; basal process slender basally, spatulate.

A very small species known only from the holotype and distinguished by the tegminal pigmentation and structure of aedeagus.

This species was synonymized with *Thelia citrina* Fairmaire by Goding (1929 : 265); an arrangement which was followed by Metcalf (1956 : 873). There is, however, no proof that this synonymy is correct and *minuta* is thus reinstated as a valid species.

MATERIAL EXAMINED.

Holotype ♂, PERU: Yurimaguas, 31.iii.1920 (USNM, Washington).

***Amastris fasciata* sp. n.**

(Text-figs 38, 98, 189, 219, 273, 319)

Length of pronotum: male 3·6–4·0 mm, female 4·0–4·2 mm; height of pronotum: male 1·3–1·4 mm, female 1·4–1·4 mm.

Male: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·75 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·8 mm, length of pronotum 4·0 mm, maximum height of pronotum

1·4 mm, length of tegmen 3·6 mm. Female: slightly larger than male, proportionately similar.

Head with vertex finely wrinkled, indistinctly and irregularly punctate; medial groove distinct basally, becoming obscure at level of ocelli. Ocelli distinct, equidistant from each other and from eyes, situated immediately below centro-ocular line. Frontoclypeus extending for almost one-third its length beyond lower margins of vertex; basal and lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length three times maximum height; sides without indentations; apex acute, not reaching tips of tegmina. Metopidium one and a half times as wide as high, rising almost vertically from base, then curving posteriorly, levelling off very slightly above humeral angles and then rising slightly again to junction with dorsum; median carina low basally, becoming gradually more prominent towards dorsum. Dorsum with maximum height at approximately one-quarter its length from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately as large as first apical cell, reaching costal margin between first and second apical cells; second apical cell smallest; fifth apical very nearly completely concealed by pronotum; subcostal cell coriaceous and punctate over basal three-quarters; apical limbus narrow; veins indistinct.

Head, pronotum, and abdomen yellow; an irregular, narrow, dark brown, vertical band on each side of pronotum from immediately posterior to humeral angles to midline at junction of metopidium and dorsum; median carina narrowly edged with black; ventral surfaces of thorax, coriaceous areas of tegmen, extreme apex of tegmen including limbus, femora, apices of fore and middle tibiae, and tarsal claws dark brown; tegmen with veins pale yellow, cells, except exposed posterior areas of third, fourth, and fifth apicals, clear hyaline, unpigmented.

Male genitalia with aedeagus U-shaped; shaft directed vertically, very slightly longer than basal apodeme; a row of large, slightly hooked spines on each side of shaft over subapical half of anterior surface, the two rows separated by a long, medial membranous flap extending from immediately below apex to just below lower spine; gonopore subapical on posterior surface. Paramere small; distal process two-fifths total length, obtusely recurved apically; numerous small spines on dorsal and lateral surfaces.

This species is closely related to *maculata*, but is distinguished by the pigmentation of the pronotum and the form of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, GUYANA: New River, 4–5.v.1938 (*Hudson*) (BMNH).

Paratypes. GUYANA: 1 ♂, 1 ♀, data as holotype (BMNH); 1 ♀, locality as holotype, 26.iii.–2.iv.1938 (BMNH). BRAZIL: 1 ♀, Para, Jacareacanga, xii.1968 (*Alvarenga*) (MZUSP, São Paulo).

Amastris exaltata (Walker) **comb. n.**

(Text-figs 1, 74, 138, 224, 278, 331)

Thelia exaltata Walker, 1858 : 140. Holotype ♀, BRAZIL (BMNH) [examined].
Gelastogonia exaltata (Walker) Funkhouser, 1927 : 315.
Hille exaltata (Walker) Goding, 1929 : 279.

Length of pronotum: male 5·0–5·6 mm, female 5·7–5·8 mm; maximum height of pronotum: male 2·4–2·8 mm, female, 3·2–3·3 mm.

Male: width of vertex excluding eyes 1·5 mm, width of vertex including eyes 2·2 mm, length of vertex to base of clypeus 0·6 mm, length of clypeus 0·6 mm, width of clypeus 0·6 mm, maximum width of pronotum 2·6 mm, length of pronotum 5·0 mm, maximum height of pronotum 2·4 mm, length of tegmen 4·6 mm. Female: larger than male, pronotum more elevated.

Head with vertex almost flat, weakly and irregularly punctate; medial groove distinct basally, becoming obscure towards junction with base of frontoclypeus. Ocelli very prominent, equidistant from each other and from eyes, situated below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal and lateral margins indistinct. Rostrum reaching to hind coxae.

Pronotum less than twice as long as high, produced anteriorly into a short, vertically directed, apically acute and laterally flattened horn; sides without indentations; apex acutely pointed, slightly decurved. Metopidium much higher from base to tip of horn than broad, vertical or slightly inclined anteriorly from base, then curving slightly posteriorly to junction with dorsum at apex of anterior horn; median carina becoming highly elevated on anterior surface of horn, keel-like on dorsum.

Tegmen with second discoidal cell small, not reaching costal margin; fourth apical cell very long and narrow; fifth apical very large, exceeding combined area of other apical cells together; subcostal cell very weakly coriaceous and weakly and sparsely punctate over basal third; veins, prominent.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, coriaceous areas and veins of tegmen dull, pale brownish yellow; ocelli shining, pale brownish; an irregular brown vertical band on each side of pronotum from base of metopidium above eye to midline just below apex on anterior surface of horn; area of metopidium between vertical bands becoming slightly paler centrally, irregularly mottled with small yellowish spots; a short brown vertical band on each lateral surface of anterior horn, extending from apex for approximately one-third distance to humeral angle; a narrow, vertical pale yellowish stripe between this band and marking on metopidium, concolorous with numerous scattered and indistinct spots posteriorly on sides of pronotum; median carina narrowly and irregularly edged with dark brown; sides of pronotum usually with numerous small, irregularly scattered dark brown spots; cells of tegmen clear hyaline, unmarked; tarsal claws dark brown.

Male genitalia with aedeagus robust, U-shaped; shaft directed vertically, slightly shorter than basal apodeme; a transverse, subapical row of large spines across anterior surface extending briefly down anterolateral surfaces; gonopore large, subapical on posterior surface. Paramere simple, robust; distal process equal to one-third total length; numerous long, strong, erect spines on dorsal and lateral surfaces; basal process expanded apically.

This is a large species with the pronotum very highly elevated and bearing a distinct anterior horn, somewhat more pronounced in the females than in the males. The pigmentation varies slightly, the eyes and ocelli may be pale, concolorous with the vertex, or dark reddish brown, often mottled, while the pale spots on the pronotum vary from being quite distinct to very obscure. The specimen figured (in AMNH, New York) has numerous irregularly scattered dark brown spots on the sides of the pronotum which are absent in the holotype.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Santarem (*Bates*) (BMNH).

GUYANA: 1 ♂, Essequibo River, Moraballi Creek, 6.x.1929 (Oxford University Expedition) (BMNH); 1 ♂, Upper Courantyne River, -.ix.1935 (*Hudson*) (BMNH); 1 ♀ Bartica District, Kartabo, 9.iii.1922 (AMNH, New York); 1 ♀, same data except 4.vi.1922 (AMNH).

This species has been previously recorded from Colombia, Ecuador, and Peru (Metcalf, 1965 : 1015).

Amastris subangulata **sp. n.**

(Text-figs 2, 73, 139, 225, 279, 333)

Length of pronotum: 4·2–4·5 mm; maximum height of pronotum: 1·6–1·7 mm.

Male: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·9 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·2 mm, length of pronotum 4·5 mm, maximum height of pronotum 1·7 mm, length of tegmen 3·8 mm.

Female unknown.

Head with vertex finely and indistinctly punctate; medial groove distinct. Ocelli large, prominent, slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending one-quarter its length beyond lower margins of vertex; basal and lateral margins distinct. Rostrum reaching hind coxae.

Pronotum slightly more than two and a half times as long as high; sides without indentations; apex acute, not reaching tips of tegmina. Metopidium one and a half times as wide as high, rising vertically from base, then curving posteriorly to smooth junction with dorsum; anterior horn at junction of metopidium and dorsum obsolete, median carina arising near base, gradually becoming elevated towards junction with dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina highly elevated, keel-like.

Tegmen with second discoidal cell approximately equal in size to third apical cell, much smaller than each of first and second apicals, not reaching costal margin; fifth apical not entirely concealed by pronotum; subcostal cell very weakly coriaceous and weakly and sparsely punctate over basal two-fifths; apical limbus broad; veins distinct.

Head, pronotum posterior to humeral angles, abdomen, ventral surfaces of thorax, legs, and coriaceous areas of tegmen, pale yellowish brown; a wide brown band on each side of metopidium from eyes to midline immediately below base of anterior horn, central area of metopidium between these bands mottled with brown and yellow; a short brown band on each side of anterior horn extending for one-quarter distance from median carina to humeral angle; median carina of dorsum narrowly edged with dark brown; cells of tegmen clear hyaline; veins brownish, slightly darker than pronotum; apical limbus tinged brownish; tarsal claws reddish brown.

Male genitalia with aedeagus U-shaped; shaft as long as basal apodeme, as broad as apodeme in lateral aspect; a transverse, subapical row of approximately eleven large spines across anterior surface, extending very slightly ventrally on lateral surfaces; gonopore subapical on posterior surface. Paramere with distal process one-third total length, apex strongly recurved; numerous small spines on anterior, lateral, and posterior surfaces; basal process very robust, apex greatly expanded, obtuse.

This species is distinguished by the obsolete anterior horn and the pigmentation of the anterior part of the pronotum. It is closely related to *angulata*, *exaltata*, and *punctata*.

MATERIAL EXAMINED.

Holotype ♂, GUYANA: New River, 4–5.v.1938 (*Hudson*) (BMNH).

Paratype. GUYANA: 1 ♂, Essequibo River, Moraballi Creek, Wallaba Forest, 19.x.1929 (*Oxford University Expedition*) (BMNH).

***Amastris inclinata* sp. n.**

(Text-figs 20, 136, 140, 221, 277, 335)

Male: width of vertex excluding eyes 0·9 mm, width of vertex including eyes 1·4 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·5 mm, length of pronotum 3·6 mm, maximum height of pronotum 1·2 mm, length of tegmen 3·0 mm.

Female unknown.

Head with vertex very obscurely punctate; medial groove distinct throughout. Ocelli large, prominent, slightly closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for almost one-third its length beyond lower margins of vertex, lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length three times maximum height, without lateral indentations; apex acutely rounded in lateral aspect, reaching to near tips of tegmina. Metopidium slightly wider than high, inclined anteriorly from base for most of its length, then curving sharply posteriorly to smooth junction with dorsum; median carina low, becoming elevated immediately prior to junction with dorsum. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell larger than each of first four apical cells, partially covered by pronotum, narrowly reaching costal margin between first and second apical cells; fifth apical cell entirely concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal third; apical limbus relatively narrow; veins indistinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, veins and coriaceous areas of tegmen, pale yellowish brown, unmarked; cells and limbus of tegmen clear hyaline, unmarked; tarsal claws reddish.

Male genitalia with aedeagus U-shaped; shaft directed vertically, longer than basal apodeme, more than half maximum breadth of apodeme in lateral aspect, a transverse subapical row of very small spines on anterior surface, extending ventrally for short distance on anterolateral surfaces; gonopore subapical on posterior surface. Paramere extremely slender; distal process slightly more than one-third total length; apex weakly chitinized with a few small spines on posterior and lateral surfaces; basal process slender basally, becoming greatly expanded and spatulate towards apex.

This species is distinguished by the angle of the metopidium in lateral aspect, and by the structure of the paramere. The aedeagus shows a possible affinity with *exigua* and *brunneipennis*.

MATERIAL EXAMINED.

Holotype ♂, VENEZUELA: Mt Duida, 6.iii.1929 (AMNH, New York).

***Amastris exigua* sp. n.**

(Text-figs 48, 113, 169, 222, 276, 314)

Length of pronotum: 3·1–3·2 mm; maximum height of pronotum: 0·9–1·0 mm.

Male: width of vertex excluding eyes 0·9 mm, width of vertex including eyes 1·4 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·3 mm, width of clypeus 0·3 mm, maximum width of pronotum 1·6 mm, length of pronotum 3·2 mm, maximum height of pronotum 1·0 mm, length of tegmen 2·8 mm.

Female unknown.

Head with vertex obscurely and irregularly punctate, medial groove distinct basally, becoming obscure towards junction with clypeus. Ocelli large, prominent, much closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-quarter its length beyond lower margins of vertex, lateral margins distinct. Rostrum reaching mid coxae.

Pronotum with length three times maximum height; sides without indentations; apex acute, not reaching tips of tegmina. Metopidium twice as wide as high, curving regularly from base to smooth junction with dorsum; median carina low basally, gradually becoming more elevated towards dorsum. Dorsum with maximum height one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell slightly larger than fourth apical cell, much larger than each of first three apicals; reaching costal margin broadly between first and second apicals; fifth apical cell not entirely concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal three-quarters; apical limbus broad; veins not prominent.

Head, pronotum, ventral surfaces of thorax, abdomen, coriaceous areas and veins of tegmen, and legs yellowish brown, unmarked; second and third apical cells and posterior margins of second discoidal and fourth and fifth apicals dark brown, remaining cells pale yellowish hyaline; apical limbus unpigmented.

Male genitalia with aedeagus U-shaped; shaft directed vertically, very nearly as long as basal apodeme, as broad as apodeme in lateral aspect, apex turned slightly anteriorly; a transverse, subapical row of blunt spines on anterior surface, extending ventrally on lateral surfaces for two-thirds length of anterior surface; gonopore very large, subapical on posterior surface. Paramere with distal process slightly more than one-third total length, very much broader than basal process in lateral aspect; a few long spines on dorsal and posterior surfaces; basal process slender, tapering, apex acute.

This species is closely related to *minuta*, but is distinguished by the proportion of the tegmen covered by the pronotum, and by the structure of the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, FRENCH GUIANA: Guyane (*Maroni*) (NCSU, Raleigh).
Paratype. FRENCH GUIANA: 1 ♂, data as holotype (BMNH).

Amastris brunneipennis Funkhouser

(Text-figs 44, 103, 181, 220, 275, 324)

Amastris brunneipennis Funkhouser, 1922 : 31. Holotype ♂, BRAZIL (USNM, Washington) [examined].

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·45 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·8 mm, length of pronotum 3·8 mm, maximum height of pronotum 1·0 mm, length of tegmen 3·3 mm.

Female unknown.

Head with vertex almost flat, densely and irregularly punctate; medial groove indistinct. Ocelli distinct, much closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for almost one-third its length beyond lower margins of vertex, basal margins obscure. Rostrum reaching beyond hind coxae.

Pronotum nearly four times as long as high; sides regularly rounded, without indentations; apex reaching to near tips of tegmina. Metopidium approximately twice as broad as high, smoothly rounded from base to junction with dorsum; median carina low near base, becoming more prominent towards junction with dorsum. Dorsum with maximum height at midlength; median carina low.

Tegmen with second discoidal cell very large, larger than each of first three apical cells, reaching costal margin broadly between first and second apical cells; fourth apical cell very large and broad, equal in size to second discoidal; fifth apical relatively small, not entirely covered by side of pronotum; subcostal cell coriaceous and densely punctate over basal three-quarters; veins distinct.

Pronotum pale yellowish brown anteriorly, becoming greenish yellow posterior to humeral angles, unmarked; head slightly paler, yellowish; ocelli yellow, shining; eyes mottled grey and yellow; basal two-thirds of tegmen including coriaceous areas, and apical limbus, dark brown; remainder of tegmen and whole of wing clear hyaline; venter of thorax, coxae, and bases of femora dark brown; abdomen with lateral and dorsal surfaces yellow, venter dark brown; tibiae and tarsi pale yellowish brown.

Male genitalia with aedeagus U-shaped; shaft directed vertically, very nearly as long as basal apodeme; a transverse, subapical row of large spines across anterior surface, briefly extending ventrally on anterolateral surfaces; gonopore very large, subapical on posterior surface. Paramere simple; distal process nearly as long as basal process; numerous long spines on dorsal and lateral surfaces; basal process robust, truncate apically.

This small species is distinguished by its very low pronotum, heavily pigmented tegmina, and the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Obidos, 10.ix.1919 (USNM, Washington).

This is the only specimen that has been available for examination. The species is recorded only from Brazil.

Amastris robusta sp. n.

(Text-figs 16, 79, 145, 226, 282, 337)

Both specimens with similar measurements.

Male: width of vertex excluding eyes 1·4 mm, width of vertex including eyes 2·3 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·6 mm, width of clypeus 0·6 mm, maximum width of pronotum 2·6 mm, length of pronotum 5·8 mm, maximum height of pronotum 2·1 mm, length of tegmen 4·8 mm.

Female unknown.

Head with vertex irregularly ridged and obscurely punctate; medial groove indistinct throughout its length. Ocelli large, prominent, equidistant from eyes as from each other, situated on centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching hind coxae.

Pronotum with length approximately two and a quarter times maximum height, without lateral indentations; apex acute, reaching tips of tegmina. Metopidium with width two and a half times height, inclined anteriorly from base, then curving posteriorly to smooth junction with dorsum; median carina becoming gradually elevated towards junction with dorsum. Dorsum with maximum height at approximately one-fifth distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell smaller than each of first and second apical cells, larger than third apical cell, not reaching costal margin; fifth apical cell not entirely concealed by pronotum; subcostal cell weakly coriaceous and weakly and sparsely punctate over basal three-eighths; apical limbus broad; veins prominent.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, coriaceous areas and veins of tegmen pale yellowish brown; head and pronotum with numerous small, irregularly scattered, bright yellow spots; median carina on dorsum irregularly edged with dark brown; cells of tegmen pale brownish hyaline, without darker markings; tarsal claws reddish brown.

Male genitalia with aedeagus U-shaped; shaft directed vertically, very robust, longer than basal apodeme, becoming gradually broader in lateral aspect from base to apex; a transverse, subapical row of very large, sharp, anteroventrally directed spines across anterior surface, continuing as a double row on anterolateral margins for slightly more than one-half length of anterior surface, becoming gradually smaller ventrally; gonopore very large, subapical on posterior surface. Paramere slender; distal process broadly recurved apically; numerous spines of various lengths on lateral, dorsal, and posterior surfaces, those on posterior surface sometimes very long; basal process slightly sinuate, almost parallel-sided, apex oblique, broadly rounded.

This species is distinguished by its large size, relatively low pronotum, and by the unique structure of the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, COSTA RICA: Turrialba, 10.xi.1971 (*Becker*) (BMNH).
Paratype. COSTA RICA: 1 ♂, data as holotype (BMNH).

Amastris fonsecai sp. n.

(Text-figs 17, 76, 148, 227, 280, 330)

Male: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·9 mm, length of vertex to base of clypeus 0·45 mm, length of clypeus 0·45 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·0 mm, length of pronotum 3·9 mm, maximum height of pronotum 1·2 mm, length of tegmen 3·5 mm. Female: slightly larger, similar in proportion; length of pronotum 4·1 mm, maximum height of pronotum 1·3 mm.

Head with vertex irregularly and indistinctly punctate, medial groove distinct basally, otherwise obsolete. Ocelli distinct, slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex; lateral margins distinct. Rostrum just passing hind coxae.

Pronotum with length three and three-quarters times maximum height; sides without indentations; apex acute, reaching tips of tegmina in male, somewhat shorter in female. Metopidium curving posteriorly from base to smooth junction with dorsum; median carina low. Dorsum with maximum height at one-third distance from humeral angles to apex; median carina prominent, not highly elevated.

Tegmen with second discoidal cell much larger than each of first three apical cells, reaching costal margin broadly between first and second apicals; fourth apical cell partially covered by pronotum in male, entirely exposed in female together with part of fifth apical; subcostal cell weakly coriaceous and sparsely punctate over basal nine-tenths; apical limbus narrow; veins distinct.

Head, pronotum, abdomen, and exposed part of anal area of tegmen pale yellowish brown, head and base of metopidium indistinctly mottled with darker brown; external margins of vertex very narrowly edged with black; ventral surfaces of thorax, hind femora, and basal part of subcostal cell dark brown; third apical cell, posterior angles of second and fourth apicals, adjacent veins and apical limbus brownish grey, remaining cells clear hyaline; other veins, posterior part of coriaceous area of subcostal cell, tibiae and tarsi pale yellowish brown.

Male genitalia with aedeagus U-shaped; shaft longer than basal apodeme, directed vertically; two transverse, subapical rows of large spines across anterior surface, extending ventrally as a single row of very large spines on lateral surfaces for distance equal to two-thirds length of anterior surface; gonopore small, subapical on posterior surface. Paramere with distal process slightly more than one-half total length, narrowly recurved apically; numerous small spines on lateral, dorsal, and posterior surfaces; basal process spatulate.

This species is distinguished by its very low pronotum and the arrangement of the very large spines on the shaft of the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Pedro Canario Es, Conceicao da Barra, x.1972 (*Alvarenga*) (BMNH).

Paratype. BRAZIL: 1 ♀, Corcovado, xi.1967 (*Alvarenga & Seabra*) (UP, Curitiba).

Amastris alapigmentata **sp. n.**

(Text-figs 39, 106, 198, 228, 283, 350)

Male: width of vertex excluding eyes 1·3 mm, width of vertex including eyes 2·0 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·6 mm, length of pronotum 5·3 mm, maximum height of pronotum 2·1 mm, length of tegmen 4·3 mm.

Female unknown.

Head with vertex densely and obscurely punctate; medial groove distinct throughout. Ocelli large, prominent, equidistant between eyes and each other, situated distinctly below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal and lateral margins distinct. Rostrum reaching just beyond mid coxae.

Pronotum with length two and a half times maximum height; sides without indentations; apex acute, reaching to near tips of tegmina. Metopidium wider than high, curving posteriorly from base to smooth junction with dorsum; median carina low basally, gradually becoming more elevated towards dorsum. Dorsum with maximum height one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to each of first three apical cells, not reaching costal margin; fifth apical cell concealed by pronotum; subcostal cell coriaceous and densely punctate over basal four-fifths; apical limbus narrow; veins distinct.

Head yellowish brown, slightly darker brown between ocelli, margins of vertex very narrowly edged with black; pronotum yellowish brown with an irregular darker brown band on each side of median carina; carina narrowly edged with black; abdomen and ventral surfaces of thorax dark brown, almost black; femora dark brown, tibiae and tarsi yellowish brown; tegmen with coriaceous area of subcostal cell concolorous basally with ventral surface of thorax, becoming paler posteriorly; veins brownish, except medial and its branches; exposed part of tegmen mainly deep brownish hyaline.

Male genitalia with aedeagus U-shaped; shaft directed vertically, slightly shorter than basal apodeme, approximately as broad as apodeme in lateral aspect; two subapical rows of twelve very large sharp spines on anterior surface; gonopore large, subapical on posterior surface. Paramere with distal process one-third total length; apex broadly recurved; numerous spines on lateral, dorsal and posterior surfaces; basal process almost parallel-sided, apex acute.

This species is distinguished by the pigmentation of the pronotum and the tegmen, and by the arrangement of spines on the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, MEXICO: Cuernavaca, 5.viii.1938 (*Lipovsky*) (NCSU, Raleigh).

Amastris triviale sp. n.

(Text-figs 66, 72, 144, 230, 281, 332)

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·9 mm, length of pronotum 3·7 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·1 mm.

Female unknown.

Head with vertex finely and irregularly ridged and punctate; medial groove obsolete. Ocelli small, distinct, one and a half times as far from each other as from eyes, situated immediately below centro-ocular line. Frontoclypeus extending approximately one-quarter its length beyond lower margins of vertex, basal and lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length three and one-quarter times maximum height, without lateral indentations; apex acute, reaching to near tips of tegmina. Metopidium with width one and a half times height, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina prominent but not highly elevated.

Tegmen with second discoidal cell approximately equal in size to each of first three apical cells, not reaching costal margin; fifth apical cell almost entirely concealed by pronotum; subcostal cell coriaceous and punctate over basal four-fifths; apical limbus narrow; veins distinct.

Pronotum, ventral surfaces of thorax, abdomen, veins and coriaceous areas of tegmen brownish yellow, unmarked; head and supra-ocular callosities slightly darker, greyish brown; cells of tegmen clear hyaline, unmarked; legs concolorous with pronotum.

Male genitalia with aedeagus U-shaped; shaft directed vertically, slightly shorter than basal apodeme; subapical group of small, blunt spines on anterior surface; gonopore large, subapical on posterior surface. Paramere with distal process two-fifths total length; a few short spines on lateral surfaces; three much longer spines dorsally; basal process almost parallel-sided, apex acute, slightly upturned.

This is a small species, with the pronotum only slightly elevated, and with very simple male genitalia.

MATERIAL EXAMINED.

Holotype ♂, GUYANA: Upper Courantyne River, ix.1935 (*Hudson*) (BMNH).

Amastris punctata sp. n.

(Text-figs 37, 91, 164, 232, 284, 334)

Male: width of vertex excluding eyes 1·3 mm, width of vertex including eyes 1·9 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·6 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·2 mm, length of pronotum 4·6 mm, maximum height of pronotum 1·8 mm, length of tegmen 4·3 mm. Female: considerably larger than male but similar in proportion; length of pronotum 5·8 mm, maximum height of pronotum 2·5 mm.

Head more than twice as wide as long; vertex almost flat, irregularly and indistinctly punctate, medial groove distinct. Ocelli small, distinct, very slightly nearer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal and lateral margins distinct. Rostrum reaching to hind coxae.

Pronotum two and a half times as long as high, sides without indentations; apex very acute, slightly decurved, not reaching tips of tegmina. Metopidium somewhat broader than high, inclined slightly anteriorly from base, meeting dorsum at almost 90° angle, anterior horn obsolete; median carina becoming highly elevated towards junction with dorsum. Dorsum with maximum height at one-third distance from metopidium to apex; median carina keel-like.

Tegmen with discoidal cells small; second not reaching costal margin, smaller than any of the apical cells; fifth apical cell not completely covered by pronotum; subcostal cell very weakly coriaceous and punctate over basal third; veins strong, prominent.

Head, pronotum, abdomen, ventral surfaces of thorax and legs, veins and coriaceous areas of tegmen dull, pale yellowish brown, head irregularly mottled with dark brown spots; ocelli shining, brownish; an irregular brown band running on each side of metopidium from below apex to base; a brown band extending from apex for approximately one-third distance to humeral angle; setose punctations of metopidium and sides of pronotum pigmented, appearing as numerous irregularly scattered, small brown spots; pronotum also with numerous indistinct whitish spots posteriorly; median carina narrowly and irregularly edged with dark brown; cells of tegmen and wing clear hyaline, unmarked; exposed part of apical limbus of tegmen weakly tinged brown; tarsal claws brown.

Male genitalia with aedeagus U-shaped; shaft robust, directed vertically, as long as basal apodeme; subapical group of approximately twelve large, slightly hooked spines on anterior surface; gonopore large. Paramere small; distal process two-fifths total length; numerous long spines on dorsal and lateral surfaces; basal process tapering, long, slender.

This is a medium sized species with the pronotum highly elevated and acutely angled anteriorly. It is distinguished from other species with similar pronotal pigmentation by the relatively small paramere, the basal process of which is not expanded apically.

MATERIAL EXAMINED.

Holotype ♂, COLOMBIA: Vaupes, River Vaupes, x.–xii. 1953 (*Taylor*) (BMNH).
Paratype. COLOMBIA: 1 ♀, data as holotype (BMNH).

Amastris froeschneri sp. n.

(Text-figs 22, 78, 163, 231, 285, 336)

Length of pronotum: male 3·2–3·6 mm, female 3·4–3·7 mm; maximum height of pronotum: male 0·9–1·0 mm, female 1·0–1·1 mm.

Male: width of vertex excluding eyes 0·9 mm, width of vertex including eyes 1·5 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·8 mm, length of pronotum 3·2 mm, maximum height of pronotum 0·9 mm, length of tegmen 3·0 mm. Female: equal in proportions to male.

Head with vertex finely and obscurely ridged and punctate; medial groove becoming obscure at level of ocelli. Ocelli small, distinct, twice as far from each other as from eyes, situated immediately above centro-ocular line. Frontoclypeus extending for one-quarter its length beyond lower margins of vertex, lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length nearly four times maximum height; without lateral indentations; apex acute, reaching to near tips of tegmina. Metopidium nearly twice as broad as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina very low. Dorsum with maximum height at approximately one-third distance from humeral angles to apex; median carina prominent, not highly elevated.

Tegmen with second discoidal cell fractionally larger than each of first and second apical cells, distinctly larger than third apical, not reaching costal margin; fifth apical cell not completely covered by pronotum; subcostal cell coriaceous and densely punctate over basal four-fifths; apical limbus broad; veins distinct.

Head, pronotum, abdomen, and legs except femora brownish yellow, unmarked; ventral surfaces of thorax, femora, basal three-fifths of subcostal cell and adjacent part of basal cell, apical limbus, third apical cell and posterior halves of fourth and fifth apicals and adjacent veins usually dark brown, almost black in females, frequently paler in males where concolorous with pronotum or slightly darker; cells in centre of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft directed vertically, as long and as broad as basal apodeme in lateral aspect; two subapical rows of small, blunt spines on anterior surface, extending ventrally on anterolateral margins as single row for one-third of length of anterior surface; gonopore large, subapical on posterior surface. Paramere with distal process two-fifths total length; a few short spines on lateral and dorsal surfaces; basal process slightly sinuate, almost parallel-sided, apex acute.

This is a small species distinguished by the low, rounded pronotum, the distinctive dark pigmentation of the females, and the structure of the male genitalia.

Material examined.

Holotype ♂, Panama: Barro Colorado Island, Canal Zone, on *Desmopsis panamensis*, 19.iv.–3.v.1945 (*Zetek*) (USNM, Washington).

Paratypes. Panama: 1 ♂, 2 ♀, data as holotype (USNM); 1 ♂, 2 ♀, data as holotype (BMNH).

Amastris angulata **sp. n.**

(Text-figs 4, 75, 137, 233, 286, 339)

Male: width of vertex excluding eyes 1·4 mm, width of vertex including eyes 2·1 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·6 mm, width of clypeus 0·6 mm, maximum width of pronotum 2·3 mm, length of pronotum 4·8 mm, maximum height of pronotum 1·8 mm, length of tegmen 4·3 mm. Female: slightly larger than male, proportionately similar; length of pronotum 5·2 mm; maximum height of pronotum 2·2 mm.

Head with vertex finely, irregularly, and obscurely punctate; medial groove distinct basally, becoming obscure towards junction with clypeus. Ocelli very large, prominent, equidistant between eyes and each other, situated below centro-ocular line. Frontoclypeus extending for slightly more than one-quarter its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching just beyond mid coxae.

Pronotum with length two and a half times maximum height; sides without indentations; apex acute, reaching to near tips of tegmina. Metopidium slightly wider than high, inclined slightly anteriorly from base then slightly posteriorly to short, anterodorsally directed horn-like junction with dorsum; median carina low basally, gradually becoming elevated towards base of horn. Dorsum with maximum height, equal to that of horn, at one-fifth distance from humeral angles to apex; median carina highly elevated, keel-like.

Tegmen with second discoidal cell approximately equal in size to third apical cell, not reaching costal margin; first and second apicals much larger; fifth apical not entirely concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal half; apical limbus broad; veins prominent.

Head, pronotum, abdomen, ventral surfaces of thorax, and coriaceous areas of tegmen pale yellowish brown; metopidium indistinctly and irregularly marked with pale brown from above eye, to midline at three-fifths of distance to junction with dorsum, paler centrally, irregularly mottled with brown and yellow; an irregular brown band on anterior horn extending ventrally for one-third distance to humeral angle; area between bands paler than remainder of pronotum; pronotum with a few small, widely and irregularly scattered dark brown spots laterally, each with short erect hair; a few very indistinct pale whitish spots posteriorly on pronotum; median carina narrowly edged with black; cells of tegmen clear hyaline; apical limbus tinged with brown; veins pale, concolorous with pronotum, those on posterior margins of apical cells darker; legs concolorous with pronotum, tarsal claws darker, reddish brown.

Male genitalia with aedeagus U-shaped; shaft as long and as broad as basal apodeme in lateral aspect; two transverse, subapical rows of large spines across anterior surface, extending as single row for short distance on anterolateral margins; gonopore large, subapical on posterior surface. Paramere with distal process one-third total length; numerous long spines on lateral, dorsal, and posterior surfaces; basal process with apex expanded and obtusely rounded.

This species is distinguished by the degree of development of the anterior pronotal horn and the proportions of the male genitalia, in particular the paramere.

MATERIAL EXAMINED.

Holotype ♂, PERU: Huanuco, Huallaga Valley, tropical jungle, 23.ii.1954 (*Waytkowski*) (NCSU, Raleigh).

Paratype. PERU: 1 ♀, data as holotype, 17.vi.1954 (BMNH).

***Amastris vicina* sp. n.**

(Text-figs 14, 88, 151, 229, 287, 341)

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·6 mm, maximum width of pronotum 1·9 mm, length of pronotum 4·4 mm, maximum height of pronotum 1·6 mm, length of tegmen 3·6 mm.

Female unknown.

Head with vertex finely and irregularly ridged, obscurely punctate; medial groove becoming indistinct at level of ocelli. Ocelli large, prominent, slightly closer to the eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for slightly less than one-third its length beyond lower margins of vertex; lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length slightly greater than two and a half times maximum height, without lateral indentations; apex acute, reaching to near tips of tegmina. Metopidium nearly as high as wide, slightly inclined anteriorly from base, then curving posteriorly to smooth junction with dorsum; median carina becoming highly elevated towards dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to each of first and second apical cells, very much larger than third apical, not reaching costal margin; fifth apical cell not completely covered by pronotum; subcostal cell weakly coriaceous and weakly, sparsely punctate over basal third; apical limbus very narrow; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmen pale brownish yellow, unmarked; cells and apical limbus of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft as long as basal apodeme, directed vertically; a dense group of large, sharp spines over apical two-fifths of anterior surface; gonopore subapical on posterior surface; apodeme expanded at midlength into large, anteriorly directed node. Paramere with distal process slightly greater than one-third total length; a few short spines on lateral and posterior surfaces; a few slightly longer spines on dorsal surface; basal process tapering slightly to acutely rounded apex.

This species is distinguished by the slight forward inclination of the metopidium, the degree of elevation and lack of dark pigmentation on the pronotum, and the arrangement and size of the spines on the shaft of the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, GUYANA: Upper Courantyne River, ix.1935 (*Hudson*) (BMNH).

Amastris finitima **sp. n.**

(Text-figs 10, 131, 150, 234, 288, 343)

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·8 mm, length of pronotum 4·2 mm, maximum height of pronotum 1·5 mm, length of tegmen 3·4 mm. Female: slightly larger than male, length of pronotum 4·5 mm, maximum height of pronotum 1·6 mm.

Head with vertex very weakly and obscurely ridged and punctate, medial groove obsolete. Ocelli large, prominent, slightly closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-quarter its length beyond lower margins of vertex, basal margins obscure. Rostrum reaching hind coxae.

Pronotum with length slightly less than three times maximum height, without lateral indentations; apex acute, not reaching tips of tegmina. Metopidium one and a half times as wide as high, slightly inclined anteriorly from base, then curving posteriorly to smooth junction with dorsum; median carina becoming elevated towards dorsum. Dorsum with maximum height at slightly less than one-fifth distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to first apical cell, slightly smaller than fourth apical, much larger than each of second and third apicals, not quite reaching costal margin; fifth apical cell not completely covered by pronotum; subcostal cell weakly coriaceous and punctate over basal quarter; apical limbus broad; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, veins and coriaceous areas of tegmen, pale yellowish brown, unmarked; cells of tegmen clear hyaline, unmarked; apical limbus and adjacent veins slightly fuscous; tarsal claws brown.

Male genitalia with aedeagus U-shaped; shaft directed vertically, very slightly shorter than and as broad as basal apodeme in lateral aspect; two transverse, subapical irregular rows of large spines on anterior surface, extending ventrally for two-fifths length of anterolateral margins; gonopore large, subapical on posterior surface. Paramere with distal process slightly more than one-third total length; eleven spines of approximately uniform length on dorsal and posterior surfaces; basal process slightly sinuate, almost parallel-sided, apex rounded.

This species is distinguished by the arrangement of spines on the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Linhares, ix.1972 (*Alvarenga*) (BMNH).
Paratype. BRAZIL: 1 ♀, data as holotype (BMNH).

Amastris pseudoelevata **sp. n.**

(Text-figs 54, 109, 191, 235, 289, 345)

Male: width of vertex excluding eyes 1·5 mm, width of vertex including eyes 2·3 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·9 mm, length of pronotum 5·7 mm, maximum height of pronotum 2·4 mm, length of tegmen 4·6 mm.

Female unknown.

Head with vertex almost flat, obscurely punctate; medial groove indistinct. Ocelli large, prominent, equidistant between each other and eyes, situated on centro-ocular line. Frontoclypeus extending for less than a quarter its length beyond lower margins of vertex; lateral and basal margins obscure. Rostrum reaching mid coxae.

Pronotum approximately two and a third times as long as high, sides without indentations; apex acute, reaching tips of tegmina. Metopidium slightly wider than high, rising vertically from base, then curving posteriorly to smooth junction with dorsum; median carina low basally, becoming highly elevated towards junction with dorsum. Dorsum highest immediately posterior to humeral angles; median carina very prominent, keel-like.

Tegmen with second discoidal cell much smaller than each of first three apical cells, not reaching costal margin; subcostal cell weakly coriaceous and shallowly punctate over basal half; veins distinct.

Head, sides of pronotum posterior to humeral angles, ventral surfaces of thorax, legs, abdomen, coriaceous areas and veins of tegmen yellowish brown; eyes and ocelli very distinctly dark brown; metopidium with a dark brown band on each side from base above eye to midline somewhat below junction with dorsum, becoming paler towards midline; dorsal keel of pronotum bright reddish brown throughout length except a small area at junction with metopidium concolorous with rest of pronotum; tegmina pale brownish hyaline.

Male genitalia with aedeagus robust, U-shaped; shaft directed vertically, slightly longer than basal apodeme; three subapical horizontal rows of spines on anterior surface; gonopore subapical on posterior surface. Paramere with distal process approximately one-third total length; a small subapical flap-like membrane on dorsal surface; approximately fourteen erect spines of varying length on dorsal, lateral, and posterior surfaces. Basal process narrow, almost parallel-sided.

This species is based on a single specimen which was previously designated as the allotype of *Amastris elevata* Funkhouser. Examination of this specimen and the holotype of *A. elevata* has proved them to be distinct species.

MATERIAL EXAMINED.

Holotype ♂, PERU: Napo River, vi.1920 (USNM, Washington).

Amastris inconspicua sp. n.

(Text-figs 67, 70, 149, 236, 290, 347)

Male: width of vertex excluding eyes 1·3 mm, width of vertex including eyes 2·1 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·6 mm, maximum width of pronotum 2·4 mm, length of pronotum 5·2 mm, maximum height of pronotum 1·7 mm, length of tegmen 4·4 mm.

Female unknown.

Head with vertex very finely and obscurely ridged and punctate; medial groove obsolete. Ocelli large, prominent, very slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal margin indistinct. Rostrum reaching middle coxae.

Pronotum with length three times maximum height; sides with shallow and obscure indentations at midlength; apex acute, reaching tips of tegmina. Metopidium one and a half times as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina becoming elevated towards dorsum. Dorsum with maximum height at one-fifth distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell larger than first apical cell, much larger than each of second and third apicals, just reaching costal margin between first and second apicals; fourth apical cell partially covered by pronotum; fifth entirely concealed; subcostal cell weakly coriaceous and punctate over basal three-quarters; apical limbus broad; veins distinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, coriaceous areas and veins of tegmen pale yellow, without markings; cells and limbus of tegmen clear hyaline, unmarked; tarsal claws pale brown.

Male genitalia with aedeagus U-shaped; shaft slightly shorter than and nearly as broad as basal apodeme in lateral aspect, directed vertically; three transverse, subapical, rows of spines on anterior surface, extending slightly onto antero-lateral surfaces; gonopore subapical on posterior surface. Paramere with distal process slightly more than half total length; approximately eleven long spines on posterior, lateral, and dorsal surfaces; basal process almost parallel-sided, apex truncate.

This medium sized species, devoid of dark pigmentation, is distinguished by the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Santa Catharina, Hansa Humboldt, W 50, S 26, 1930 (*Maller*) (BMNH).

***Amastris obscura* sp. n.**

(Text-figs 58, 121, 184, 237, 291, 349)

Male: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·0 mm, length of pronotum 4·6 mm, maximum height of pronotum 1·4 mm, length of tegmen 4·1 mm. Female: length of pronotum 4·2–4·5 mm, maximum height of pronotum 1·6–1·7 mm.

Head with vertex finely ridged and obscurely punctate; medial groove distinct from base to level of ocelli. Ocelli small, distinct, equidistant between each other and eyes, situated immediately below centro-ocular line. Frontoclypeus extending for approximately one-quarter its length beyond lower margins of vertex, lateral and basal margins distinct. Rostrum reaching hind coxae.

Pronotum with length slightly more than three times maximum height, with very shallow and obscure lateral indentations at midlength; apex acute, reaching to near tips of tegmen. Metopidium almost one and a half times as wide as high, almost vertical from base, then curving posteriorly to smooth junction with dorsum; median carina becoming gradually elevated towards dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell larger than fourth apical, very much larger than each of first three apical cells, reaching costal margin broadly between first and second apicals; fifth apical not completely covered by pronotum; subcostal cell coriaceous and densely punctate over basal nine-tenths; apical limbus relatively narrow; veins distinct.

Head, pronotum, abdomen, coriaceous areas and veins of tegmen, deep yellow, unmarked; ventral surfaces of thorax, legs, and basal third of subcostal cell, brownish; cells and limbus of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft slightly longer than basal apodeme, directed vertically, apex inclined slightly towards apodeme; a dense group of small, blunt spines over apical two-thirds of anterior surface; gonopore subapical on posterior surface; apodeme massive, almost six times as broad as shaft in lateral apect. Paramere with distal process slightly less than one-half total length; numerous small spines of uniform length on dorsal and lateral surfaces; basal process gradually tapering to slightly upturned, acutely rounded apex.

This species is distinguished primarily by the massive basal apodeme of the aedeagus.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Rio Brilhante, 25.x.1970 (*Becker*) (UP, Curitiba).

Paratype. GUYANA: 1 ♀, Money Jump, Essequibo River, 9.x.1929 (*Oxford University Expedition*) (BMNH); 1 ♀, New River, viii.1934 (*Hudson*) (BMNH).

***Amastris singularis* sp. n.**

(Text-figs 65, 69, 147, 238, 292, 352)

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·8 mm, length of pronotum 3·8 mm, maximum height of pronotum 1·2 mm, length of tegmen 3·4 mm. Female: slightly larger than male, length of pronotum 4·2–4·5 mm, maximum height of pronotum 1·3–1·5 mm.

Head with vertex irregularly ridged and punctate; medial groove becoming obscure at level of ocelli. Ocelli large, distinct, slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching hind coxae.

Pronotum three times as long as high, without lateral indentations; apex acute, reaching to near tips of tegmina. Metopidium more than one and a half times as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina low, distinct. Dorsum with maximum height immediately posterior to humeral angles; median carina elevated, keel-like.

Tegmen with second discoidal cell as large as fourth apical cell, reaching costal margin broadly between first and second apical cells; first and third apical cells smaller, second very small; fifth apical cell completely covered by pronotum; subcostal cell heavily coriaceous and densely punctate over basal third, mid third of cell less coriaceous with punctation more scattered; apical limbus broad; veins distinct.

Head, metopidium, and ventral surfaces of thorax reddish brown; pronotum, abdomen, coriaceous areas and veins of tegmen, and legs dull, yellowish brown, unmarked except basal third of subcostal cell which is concolorous with ventral surface of thorax; cells and apical limbus of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft distinctly longer than, and less than one half width of basal apodeme in lateral aspect, directed vertically; a dense group of small, blunt spines over apical two-thirds of anterior surface; gonopore subapical on posterior surface. Paramere with distal process slightly more than one-third total length; a few spines on dorsal surface; very few small spines on lateral surface; basal process becoming gradually expanded from base to spatulate, obtusely rounded apex.

This species is distinguished by the proportions of the head and pronotum, the lack of dark pigmentation on the pronotum, and the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Foz do Iguarcu, mercury vapour trap, 7.xii.1966 (UP, Curitiba).

Paratypes. BRAZIL: 1 ♀, data as holotype (UP); 1 ♀, data as holotype (BMNH).

Amastris undulata **sp. n.**

(Text-figs 25, 90, 152, 239, 293, 354)

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·9 mm, length of pronotum 3·7 mm, maximum height of pronotum 1·0 mm, length of tegmen 3·4 mm.

Female unknown.

Head with vertex irregularly and obscurely punctate, medial groove indistinct throughout its length. Ocelli very large, prominent, slightly closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for slightly more than one-third its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching hind coxae.

Pronotum with length three and a half times maximum height, shallowly and indistinctly indented immediately posterior to humeral angles, at mid-length and in posterior third; apex acute, not reaching tips of tegmina. Metopidium with breadth slightly more than twice height, inclined slightly anteriorly from base, then curving dorsally and posteriorly, levelling off slightly above humerals, then rising slightly again to smooth junction with dorsum; median carina low, gradually elevated near junction with dorsum. Dorsum with maximum height at approximately one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell slightly larger than each of first three apical cells, just reaching costal margin between first and second apical cells; fifth apical not completely covered by pronotum; subcostal cell weakly coriaceous and finely and sparsely punctate over basal four-fifths; apical limbus relatively narrow; veins slender, distinct.

Head reddish brown, unmarked; pronotum pale yellowish laterally, irregularly and indistinctly mottled with pale brown; junction of metopidium and dorsum and areas between lateral indentations in posterior third with darker brown markings; median carina at these points irregularly edged with dark brown; metopidium with irregular dark brown band on each side from internal angle of eye to midline at level of humeral angles, the area between these bands irregularly mottled with light and dark brown and pale yellow; ventral surfaces of thorax, legs, abdomen, pale reddish brown, concolorous with head; tarsal claws darker brown; veins and coriaceous areas of tegmen pale brownish yellow; cells and apical limbus clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft directed vertically, as long as and two-fifths as broad as basal apodeme, in lateral apect; a dense group of small, blunt spines over apical quarter of anterior surface; gonopore small, subapical on posterior surface. Paramere large, twice length of shaft; distal process approximately one-half total length; apex narrow; numerous small spines on lateral surfaces; an approximately equal number of longer spines on dorsal surface; basal process increasing in width towards apex.

This species is distinguished by the very low pronotum which is distinctly stepped in lateral profile above the humeral angles. It is closely related to *specialis* but differs in the extent to which the tegmina are covered by the pronotum, and in the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Encruzilhada, xi.1972 (*Seabra & Alvarenga*) (BMNH).

Amastris viridisparsa **sp. n.**

(Text-figs 31, 99, 179, 240, 294, 338)

Male: width of vertex excluding eyes 0·8 mm, width of vertex including eyes 1·3 mm, length of vertex to base of clypeus 0·3 mm, length of clypeus 0·3 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·5 mm, length of pronotum 2·8 mm, maximum height of pronotum 0·8 mm, length of tegmen 2·5 mm.

Female unknown.

Head with vertex irregularly and indistinctly ridged and punctate; medial groove basally distinct, becoming obsolete near junction with clypeus. Ocelli large, prominent, slightly closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, lateral margins distinct.

Pronotum with length three and a half times maximum height; sides with very shallow and indistinct indentations at midlength; apex acute, terminating some distance before tips of tegmina. Metopidium more than one and a half times as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising near base, low, becoming only slightly elevated before junction with dorsum. Dorsum with maximum height at approximately one-third distance from humeral angle to apex; median carina prominent, not highly elevated.

Tegmen with second discoidal cell slightly larger than each of first and second apical cells, smaller than third and fourth apicals, not reaching costal margin; fifth apical cell not entirely concealed by pronotum; subcostal cell coriaceous and punctate over basal three-quarters; apical limbus broad; veins distinct.

Head and pronotum pale reddish brown, pronotum with irregular greenish spots; ventral surface of thorax, abdomen, legs, veins and coriaceous areas of tegmen slightly paler, brownish yellow; cells of tegmen clear hyaline, unmarked; apical limbus unmarked.

Male genitalia with aedeagus U-shaped; shaft directed vertically, longer than basal apodeme; a group of small, blunt spines over apical fifth of anterior surface; gonopore relatively small, subapical on posterior surface. Paramere with distal process two-fifths total length; approximately twelve small spines on dorsal and lateral surfaces; basal process almost parallel-sided, apex acute.

This is the smallest species yet known, and is distinguished by the very large third apical cell of the tegmen and by the pigmentation of the pronotum which resembles that of *guttata*.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Pará, Jacareacanga, xii.1969 (*Barbosa*) (UP, Curitiba).

Amastris flava sp. n.

(Text-figs 41, 107, 187, 242, 295, 340)

Length of pronotum: male 4·1–4·2 mm, female 4·2–4·6 mm; maximum height of pronotum: male 1·3–1·4 mm, female 1·4–1·5 mm.

Male: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·9 mm, length of pronotum 4·2 mm, maximum height of pronotum 1·4 mm, length of tegmen 3·8 mm. Female: similar in proportions.

Head with vertex finely, irregularly and indistinctly punctate; medial groove distinct throughout. Ocelli small, distinct, very slightly closer to eyes than to each other, situated some distance below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex; lateral and basal margins distinct. Rostrum reaching posterior coxae.

Pronotum with length slightly less than three times height; sides without indentations; apex acute, not reaching tips of tegmina. Metopidium one and a half times as wide as high, curving regularly from base to smooth junction with dorsum; median carina low basally, becoming gradually more elevated towards dorsum. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to fourth apical cell, very much larger than each of first three apicals, reaching costal margin narrowly between first and second apical cells; fifth apical not entirely concealed by pronotum; subcostal cell weakly coriaceous and sparsely punctate over basal three-quarters; apical limbus broad; veins indistinct.

Head, pronotum, apices of femora, bases of fore and middle tibiae, and entire hind tibia bright yellow; median carina narrowly edged with black; ventral surfaces of thorax, bases of femora, apices of fore and middle tibiae, and basal third of coriaceous area of subcostal cell of tegmen dark brown, almost black; tegmen with veins very pale yellow, often unpigmented; apical limbus and adjacent veins on posterior margins of apical cells brown; all cells unpigmented hyaline.

Male genitalia with aedeagus U-shaped; shaft very slender, approximately one-quarter as broad as, and distinctly longer than, basal apodeme in lateral aspect, directed vertically; apex inclined slightly anteriorly; a dense group of small blunt spines over apical third of anterior surface. Paramere with distal process approximately half total length, very broad basally in lateral apect; twelve to fourteen erect spines subapically on dorsal and lateral surfaces; basal process short, sinuate, apically acute.

This species is distinguished by the pigmentation and by the structure of the aedeagus. The pigmentation of the females is often weaker than that of the males, with the ventral surface of the thorax pale brown, though usually still distinctly darker than the pronotum.

MATERIAL EXAMINED.

Holotype ♂, PERU: Santa Isabel, Cusco, 1–3.i.1952 (*Waytkowski*) (NCSU, Raleigh).

Paratypes. PERU: 2 ♂, 5 ♀, data as holotype (NCSU); 2 ♂, 4 ♀, data as holotype (BMNH); 2 ♀ Iquitos, 5.viii.1960 (NCSU).

***Amastris reclusa* sp. n.**

(Text-figs 28, 115, 171, 241, 296, 342)

Male: width of vertex excluding eyes 0·8 mm, width of vertex including eyes 1·4 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·5 mm, length of pronotum 3·1 mm, maximum height of pronotum 1·0 mm, length of tegmen 2·7 mm. Female: a little larger than male, pronotum slightly more elevated; pronotal length 3·5 mm, maximum height of pronotum 1·2 mm.

Head with vertex very finely and obscurely ridged and punctate; medial groove distinct basally, becoming obscure below level of ocelli. Ocelli distinct, slightly nearer to eyes than to each other; situated on centro-ocular line. Frontoclypeus extending for little more than one-quarter its length beyond lower margins of vertex; lateral and basal margins distinct. Rostrum reaching just beyond hind coxae.

Pronotum with length more than three times maximum height; sides shallowly and indistinctly indented immediately posterior to humeral angles and again at midlength; apex acute, terminating before tips of tegmina. Metopidium nearly twice as wide as high, curving posteriorly from base to make an almost smooth junction with dorsum; median carina arising immediately above base, distinct, becoming elevated towards junction with dorsum. Dorsum with maximum height at one-third distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell as large as fourth apical, distinctly larger than each of first three apical cells, not reaching, costal margin; fifth apical cell not completely concealed by pronotum; subcostal cell coriaceous over basal quarter, finely punctate over basal three-quarters of cell; apical limbus broad; veins narrow, not prominent.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmen, pale yellowish brown, unmarked; cells and limbus of tegmen unpigmented.

Male genitalia with aedeagus U-shaped; shaft directed vertically, longer than and almost as broad as basal apodeme in lateral aspect; a dense group of small blunt spines over apical third of anterior surface; gonopore large, subapical on posterior surface. Paramere with distal process less than half total length, little broader than basal process in lateral aspect; approximately fourteen small spines over dorsal and lateral surfaces; basal process approximately parallel-sided, apex rounded.

Although this is not a very distinctive species, it is nevertheless distinguishable by a total lack of dark pigmentation, its small size and low pronotum, and the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Mato Grosso, 12°49′ S 51°45′ W, gallery forest, 25.xi.1968 (*Knight*) (BMNH).

Paratype. BRAZIL: 1 ♀, data as holotype (BMNH).

Specimens collected on Royal Society / Royal Geographical Society Xavantina / Cachimbo Expedition 1967–69.

Amastris guttata Fonseca

(Text-figs 27, 100, 195, 245, 297, 346)

Amastris guttata Fonseca, 1941 : 139. Holotype ♀, BRAZIL (MZUSP, São Paulo) [examined].

Length of pronotum: male 3·0–3·1 mm, female 3·6–4·2 mm; maximum height of pronotum: male 0·9 mm, female 1·3–1·4 mm.

Male: width of vertex excluding eyes 0·9 mm, width of vertex including eyes 1·4 mm, length of vertex to base of clypeus 0·4 mm, width of clypeus 0·4 mm, length of clypeus 0·4 mm, maximum width of pronotum 1·5 mm, length of pronotum 3·1 mm, maximum height of pronotum 0·9 mm, length of tegmen 2·6 mm. Female: considerably larger than male but proportionately similar; pronotal length 4·0 mm, maximum height of pronotum 1·4 mm.

Head with vertex obscurely ridged and punctate; medial groove distinct basally, becoming obsolete near base of clypeus. Ocelli prominent, closer to the eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal margins obscure. Rostrum reaching hind coxae.

Pronotum three times as long as high, sides without indentations, apex acute, terminating immediately before tips of tegmina. Metopidium nearly twice as wide as high, curving posteriorly from base to smooth junction with dorsum; median carina arising near base, prominent but not highly elevated. Dorsum with maximum height at one-quarter distance from humeral angle to apex; median carina low, not keel-like.

Tegmen with second discoidal cell approximately equal in size to each of first three apical cells, nearly reaching costal margin; fifth apical cell completely covered by pronotum; subcostal cell weakly coriaceous and punctate over basal four-fifths; veins distinct.

Head, abdomen, ventral surfaces of thorax, legs, and veins and coriaceous areas of tegmen pale brown, head sometimes darker in males and occasionally mottled with dark brown or black; pronotum red with irregular pale green patches giving reticulate appearance; cells of tegmen unpigmented; apices of tibiae and tarsi dark brown.

Male genitalia with aedeagus robust, U-shaped; shaft longer than, and as broad as, basal apodeme in lateral aspect; a dense group of small spines over apical two-fifths of anterior surface; gonopore large, situated subapically on posterior surface. Paramere simple; distal process almost one-half total length; a few erect spines on dorsal and lateral surfaces; basal process almost parallel-sided, apex blunt.

This species may be immediately distinguished by the very distinctive pronotal pigmentation and the very robust shaft of the aedeagus.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Belem, Para, 10.x.1938 (*Sauer*) (MZUSP, São Paulo). GUYANA: 2 ♂, 3 ♀, New River, 26.ii.1938 (*Hudson*) (BMNH).

Amastris evexa **sp. n.**

(Text-figs 57, 123, 175, 243, 298, 356)

Length of pronotum: male 3·4–3·6 mm, female 3·9–4·2 mm; maximum height of pronotum: male 1·3 mm, female 1·6–1·8 mm.

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·8 mm, length of pronotum 3·6 mm, maximum height of pronotum 1·3 mm, length of tegmen 3·2 mm.

Female: slightly larger than male, pronotum more elevated, length of pronotum 4·2 mm, maximum height of pronotum 1·7 mm.

Head with vertex obscurely ridged and punctate; medial groove becoming indistinct towards junction with clypeus. Ocelli large, not prominent, closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex; lateral and basal margins obscure. Rostrum reaching to hind coxae.

Pronotum with length slightly less than three times maximum height; sides with a shallow indentation immediately posterior to humeral angle, another at midlength, and a third in posterior third; apex acute, terminating well before tips of tegmina. Metopidium slightly less than one and a half times as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina low basally, gradually becoming more elevated towards dorsum. Dorsum with maximum height slightly less than one-quarter distance from humeral angles to apex; median carina prominent, elevated.

Tegmen with second discoidal cell approximately equal in size to each of first and third apical cells, larger than second apical, slightly smaller than fourth apical, not reaching costal margin; fifth apical cell relatively well exposed; subcostal cell very weakly and indistinctly coriaceous and punctate over basal three-quarters; apical limbus broad; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, and veins and coriaceous areas of tegmen yellowish brown, without markings; cells of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft not as long as basal apodeme, directed vertically, apex converging slightly with apodeme; a dense group of small blunt spines over apical quarter of anterior surface; gonopore small, situated subapically on posterior surface. Paramere very large relative to size of aedeagus; distal process slightly less than one-half total length, obtusely recurved apically; approximately ten large spines on dorsal surface and a few smaller spines subapically on lateral surface; basal process long and slender, almost parallel-sided, apex acutely truncate.

This species lacks dark pigmentation and is distinguished by the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Pará, Belem, iv.1954 (*Fonseca*) (MZUSP, São Paulo).

Paratypes. BRAZIL: 3 ♀, data as holotype (MZUSP); 1 ♂, 2 ♀, data as holotype (BMNH).

Amastris affinis sp. n.

(Text-figs 15, 81, 160, 244, 299, 358)

Male: width of vertex excluding eyes 1·3 mm, width of vertex including eyes 2·1 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·4 mm, length of pronotum 4·8 mm, maximum height of pronotum 1·3 mm, length of tegmen 4·2 mm.

Female unknown.

Head with vertex very distinctly and boldly punctate; medial groove distinct. Ocelli large, prominent, equidistant between eyes and each other, situated slightly below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal and lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length three and three-quarters times maximum height, without lateral indentations; apex acute, almost reaching tips of tegmina. Metopidium with width almost twice height, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina low, becoming elevated at junction with dorsum. Dorsum with maximum height at slightly less than one-third distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell slightly larger than each of first three apical cells, reaching costal margin; fourth apical cell large; fifth entirely concealed by pronotum; subcostal cell weakly coriaceous over basal third, finely punctate over basal four-fifths; apical limbus narrow; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmen pale yellowish brown, unmarked; ocelli narrowly edged with scarlet; tarsal claws brown; cells and limbus of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft directed vertically, shorter than and almost as broad as basal apodeme in lateral aspect; a dense group of small blunt spines over apical three-eighths of anterior surface; gonopore subapical on posterior surface. Paramere very large; distal process massive, almost half total length, apex slender; numerous slightly curved spines on lateral and posterior surfaces, a few very long spines on dorsal surface; basal process slender, less than one-third width of distal process in lateral aspect, slightly expanded apically.

This species is similar to *fallax*, but differs in the much heavier punctation on the head, the more prominent ocelli, and slight but distinct differences in the proportions of the head. It is distinguished from all other species by the structure of the male genitalia, particularly the paramere.

MATERIAL EXAMINED.

Holotype ♂, PANAMA: Canal Zone, Mojinga Swamp, 20.xi.1951 (*Blanton*) (USNM, Washington).

Amastris conspicua sp. n.

(Text-figs 7, 133, 157, 246, 300, 344)

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·8 mm, length of pronotum 4·0 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·7 mm.

Female unknown.

Head with vertex very weakly and obscurely ridged and punctate, medial groove distinct basally. Ocelli large, prominent, twice as far from each other as from eyes, situated on centro-ocular line. Frontoclypeus extending for approximately one-third its length beyond lower margins of vertex, basal margins obscure. Rostrum reaching posterior coxae.

Pronotum with length three and a half times maximum height, without lateral indentations; apex acute, terminating well before tips of tegmina. Metopidium with width nearly twice height, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising abruptly some distance above base, highly elevated. Dorsum with maximum height at one-eighth distance from humeral angles to apex; median carina slightly less elevated than on metopidium, keel-like.

Tegmen relatively little covered by pronotum; second discoidal cell as large as each of first and second apical cells, slightly smaller than third apical cell, not reaching costal margin; fifth apical cell not completely concealed by pronotum, relatively small; subcostal cell coriaceous and punctate over basal third; apical limbus broad; veins very prominent.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmen pale brown, mottled with darker brown; metopidium with irregular ridges and median carina dark brown; head with a dark brown stripe on each side of medial groove against inner margin of ocellus extending from base to lateral lobe of frontoclypeus; tarsal claws black; tegmen with cells clear hyaline, apical limbus pale brownish.

Male genitalia with aedeagus U-shaped; shaft directed vertically, shorter than and almost as broad as basal apodeme in lateral aspect; a dense group of spines over apical third of anterior surface; gonopore very large, subapical on posterior surface. Paramere with distal process approximately one-third total length; numerous spines on dorsal and posterior surfaces; basal process very robust, greatly expanded apically, spatulate.

This species is distinguished by the relatively large area of exposed tegmen, the size of the apical cells, the unique form of the median carina on the metopidium, and the pattern of pigmentation on the head.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Encruzilhada, xi.1972 (*Alvarenga/Seabra*) (BMNH).

Amastris notata sp. n.

(Text-figs 33, 101, 197, 248, 301, 353)

Male: width of vertex excluding eyes 0·1 mm, width of vertex including eyes 1·5 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·7 mm, length of pronotum 3·3 mm, maximum height of pronotum 1·0 mm, length of tegmen 3·2 mm. Female: similar in proportions to male; length of pronotum 3·0–3·2 mm; maximum height of pronotum 0·8–1·0 mm.

Head with vertex roughly, irregularly and distinctly ridged and punctate; medial groove distinct throughout. Ocelli large, prominent, somewhat closer to the eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, lateral and basal margins distinct. Rostrum reaching hind coxae.

Pronotum with length one and a third times maximum height; sides with a distinct shallow indentation immediately posterior to humeral angles, another at midlength, and a third in posterior third; apex acute, not reaching tips of tegmina. Metopidium more than twice as wide as high, curving dorsally and posteriorly from base, levelling out slightly above humeral angles, then rising again to junction with dorsum; median carina arising near base, low, distinct. Dorsum with maximum height at one-quarter distance from humeral angles to apex.

Tegmen with second discoidal cell very slightly larger than each of first three apical cells, reaching costal margin; fifth apical cell almost entirely concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal three-fifths; apical limbus broad; veins prominent.

Pigmentation variable; pronotum dull, pale brownish, an irregular dark brown vertical band laterally from medial carina posterior to central indentation to one-third distance from lower margin; metopidium and pronotum anterior to highest point mottled with dark brown, an irregular dark brown band in dark forms on each side of metopidium from base to midline at junction with dorsum; only supra-ocular callosities darkly pigmented in pale forms; head mottled with dark brown; ocelli pale brown, narrowly edged with crimson; ventral surfaces of thorax and adjacent coriaceous areas of tegmen dark brown; abdomen yellowish brown; legs with femora dark brown, tibiae and tarsi paler, concolorous with sides of pronotum; veins of tegmen very pale yellowish brown, only slightly pigmented; cells and apical limbus clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft robust, directed vertically, very slightly shorter than and more than half as broad as basal apodeme in lateral aspect; a dense group of short, blunt spines over apical third of anterior surface; gonopore large, situated on posterior surface. Paramere with distal process approximately one-third of total length, with approximately eight short spines on lateral surfaces; fewer longer spines on dorsal surface; basal process almost parallel-sided, apex acute.

This species is closely related to *sakakibarai* but differs in the pronotal pigmentation and the structure of the male genitalia. It differs from *maculata* and *undulata* in the proportions of the basal apodeme of the aedeagus, the arrangement of spines on the paramere, and the tegminal and pronotal pigmentation.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Parà, Belém, 1945 (*Fonseca*) (MZUSP, São Paulo).

Paratypes. BRAZIL: 1 ♀, São Paulo, Aimores (*Fonseca*) (MZUSP); 1 ♀, São Paulo, Aimores (*Fonseca*) (BMNH).

***Amastris pseudomaculata* sp. n.**

(Text-figs 19, 130, 143, 247, 302, 355)

Length of pronotum 3·3–3·5 mm; maximum height of pronotum 0·9 –1·1 mm.

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·3 mm, maximum width of pronotum 1·7 mm, length of pronotum 3·3 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·0 mm.

Female unknown.

Head with vertex very irregularly ridged and punctate; medial groove becoming obscure at level of ocelli. Ocelli large, prominent, slightly nearer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal and lateral margins distinct. Rostrum reaching hind coxae.

Pronotum with length three times maximum height, with a weak and indistinct lateral indentation immediately posterior to humeral angle, another at midlength, and a third in posterior third; apex acute, not reaching tips of tegmina. Metopidium with breadth slightly less than twice height, curving dorsally and posteriorly from base, levelling off slightly before smooth junction with dorsum, median carina becoming elevated near junction with dorsum. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to each of first three apical cells, not reaching costal margin; fifth apical cell not completely covered by pronotum; subcostal cell coriaceous over basal two-fifths, finely punctate over basal four-fifths; apical limbus broad; veins distinct.

Pronotum, except for central area of metopidium, ventral surfaces of thorax, abdomen, veins and coriaceous areas of tegmen, and legs, pale yellowish brown; metopidium mottled with dark brown; basal two-fifths of subcostal cell sometimes dark brown; head brown; cells of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft as long as and approximately half as broad as basal apodeme in lateral aspect, directed vertically; a dense group of very small blunt spines over apical third of anterior surface; gonopore subapical on posterior surface. Paramere with distal process approximately half total length; numerous small spines on lateral surfaces; longer spines on dorsal surface; basal process slender, becoming gradually expanded towards apex, spatulate.

This species is distinguished from *maculata* by the more rounded metopidium and the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, PANAMA: Rio Las Lajas, nr Coronado Beach, 17.x.1952 (*Blanton*) (USNM, Washington).

Paratypes. PANAMA: 1 ♂, Mojinga Swamp, Canal Zone, 19.xi.1951 (*Blanton*) (USNM); 1 ♂, data as above except 27.xi.1951 (BMNH).

Amastris specialis sp. n.

(Text-figs 23, 87, 161, 250, 303, 361)

Male: width of vertex excluding eyes 1·3 mm, width of vertex including eyes 2·1 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·3 mm, length of pronotum 4·5 mm, maximum height of pronotum 1·2 mm, length of tegmen 3·9 mm. Female: pronotum rather more elevated, length 4·5 mm, maximum height 1·4 mm.

Head with vertex very irregularly and indistinctly punctate; medial groove obsolete. Ocelli very prominent, slightly closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for approximately one-third its length beyond lower margins of vertex, basal margins indistinct. Rostrum just reaching to hind coxae.

Pronotum with length three and three-quarters maximum height; a shallow and indistinct indentation laterally immediately posterior to humeral angles, another at midlength, and a third in posterior third; apex acute, almost reaching tips of tegmina. Metopidium slightly more than twice as wide as maximum height, curving dorsally and posteriorly from base, levelling off slightly above humeral angles, then rising again at junction with dorsum; median carina becoming elevated at junction with dorsum. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately as large as third apical cell, slightly larger than each of first and second apicals, reaching costal margin; fifth apical cell almost entirely concealed by pronotum; subcostal cell weakly coriaceous and sparsely and distinctly punctate over basal five-sixths; apical limbus broad; veins prominent.

Pronotum pale brownish yellow, metopidium with an irregular slightly darker band on each side from above internal angle of eye to midline at junction with dorsum, the band continuing indistinctly posteriorly to anterior margin of second lateral indentation; median carina anterior and posterior to second lateral indentation very narrowly edged with dark brown; head yellowish brown, unmarked; ventral surface of thorax, legs, abdomen, veins and coriaceous areas of tegmen pale yellowish brown; apical limbus and cells of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft directed vertically, slightly shorter than, and very slightly more than one-quarter maximum width of basal apodeme in lateral aspect; a dense group of small spines over apical two-fifths of anterior surface; gonopore subapical on posterior surface. Paramere massive, more than twice length of shaft; distal process two-fifths total length, a large number of small spines on lateral surfaces, a similar number of spines of various lengths on dorsal surface; basal process more slender, almost parallel-sided, apex slightly upturned, acutely rounded.

This species is distinguished by the low, stepped pronotum and the massive paramere. It differs from the closely related *undulata* in the structure of the male genitalia and the extent to which the tegmen is covered by the pronotum.

MATERIAL EXAMINED.

Holotype ♂, COSTA RICA: Turrialba, 15.vii.1971 (*Becker*) (BMNH).
Paratype. COSTA RICA: 1 ♀, data as holotype (BMNH).

Amastris melina sp. n.

(Text-figs 68, 71, 141, 251, 366)

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·9 mm, length of pronotum 3·6 mm, maximum height of pronotum 1·4 mm, length of tegmen 3·3 mm. Female: fractionally larger than male, proportionately similar; length of pronotum 3·8 mm, maximum height of pronotum 1·5 mm.

Head with vertex very obscurely and irregularly punctate; medial groove becoming indistinct at level of ocelli. Ocelli large, prominent, closer to the eyes than to each other, situated below centro-ocular line. Frontoclypeus extending for less than one-third its length beyond lower margins of vertex, lateral margins indistinct. Rostrum reaching hind coxae.

Pronotum with length two and a half times maximum height, a very shallow and indistinct indentation on each side at midlength; apex acute, terminating some distance from tips of tegmina. Metopidium slightly less than one and a half times as wide as high, curving regularly dorsally and posteriorly from base to smooth junction with dorsum. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell slightly larger than each of first three apical cells, reaching costal margin between first and second apicals; fourth apical slightly larger than second discoidal; fifth almost completely covered by pronotum; subcostal cell weakly coriaceous over basal third, finely punctate over basal two-thirds; apical limbus broad; veins indistinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, coriaceous areas and veins of tegmen pale yellowish brown; pronotum very indistinctly mottled with pale yellow; tarsal claws brown; cells and apical limbus of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft directed vertically, as long as and slightly more than one-third as broad as basal apodeme in lateral aspect; a dense group of small blunt spines over apical third of anterior surface; gonopore subapical on posterior surface. Paramere with distal process slightly less than half total length; numerous small spines on lateral surface; longer spines on dorsal surface; basal process almost parallel-sided, apex rounded.

This is a small species with the pronotum relatively highly elevated and unmarked, and the male genitalia simple.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Parà, Belem, iv.1954 (*Fonseca*) (MZUSP, São Paulo).
Paratype. BRAZIL: 1 ♀, data as holotype (BMNH).

Amastris depressa sp. n.

(Text-figs 59, 118, 172, 259, 311, 357)

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·7 mm, length of pronotum 4·0 mm, maximum height of pronotum 1·3 mm, length of tegmen 3·4 mm.

Female unknown.

Head with vertex irregularly and obscurely punctate, medial groove distinct. Ocelli small, not prominent, much closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for almost half its length beyond lower margins of vertex, lateral and basal margins distinct. Rostrum reaching hind coxae.

Pronotum three times as long as maximum height, without lateral indentations; apex acute, not reaching tips of tegmina. Metopidium approximately one and a half times as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina low basally, becoming elevated at half distance to junction with dorsum. Dorsum with maximum height slightly less than one-quarter its length posterior to humeral angles, a shallow indentation dorsally slightly posterior to midlength; median carina keel-like.

Tegmen with second discoidal cell equal in size to each of first and third apical cells, much larger than second apical, reaching costal margin narrowly between first and second apicals; fifth apical cell not completely concealed by pronotum; subcostal cell coriaceous and punctate over basal three-eighths; apical limbus broad; veins distinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, coriaceous areas and veins of tegmen yellow, unmarked; cells and limbus of tegmen clear hyaline, unmarked; tarsal claws brown.

Male genitalia with aedeagus U-shaped; shaft directed vertically, longer than and as broad as basal apodeme in lateral aspect, a dense group of small blunt spines over slightly more than apical half of anterior surface; gonopore subapical on posterior surface. Paramere small, distal process slightly more than half total length; a few short spines scattered over lateral surfaces; a slightly greater number of much longer spines on dorsal surface; basal process straight, parallel-sided, truncate apically.

This species is distinguished by the low, somewhat depressed, dorsum, and the very simple male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Vicosa, Minas Gerais, 3.iv.1933 (*Hambleton*) (MZUSP, São Paulo).

***Amastris gregaria* sp. n.**

(Text-figs 63, 126, 178, 249, 304, 363)

Length of pronotum: male 3·7–4·3 mm, female 4·0–4·5 mm; maximum height of pronotum: male 1·2–1·5 mm, female 1·3–1·6 mm.

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·9 mm, length of pronotum 4·1 mm, maximum height of pronotum 1·2 mm, length of tegmen 3·7 mm. Female: slightly larger than male; pronotum rather more elevated.

Head with vertex finely and obscurely ridged and punctate; medial groove basally distinct, becoming obsolete at level of ocelli. Ocelli large, distinct, slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal margins obscure. Rostrum reaching hind coxae.

Pronotum with length nearly three and a half times maximum height; sides with a distinct shallow indentation immediately posterior to humeral angle, another at midlength, and a third in posterior third; apex acute, not reaching tips of tegmina. Metopidium more than one and a half times as wide as high; curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising some distance above base, becoming highly elevated at junction with dorsum. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to each of first three apical cells, not reaching costal margin; fifth apical entirely concealed by pronotum; subcostal cell very weakly coriaceous and punctate over basal five-sixths; veins narrow, indistinct; apical limbus broad.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, and coriaceous areas of tegmen pale yellowish brown, unmarked; cells of tegmen unpigmented; veins pale yellow or unpigmented; tarsal claws brown.

Male genitalia with aedeagus U-shaped; shaft directed vertically, as long as basal apodeme; a dense group of short blunt spines over apical half of anterior surface; gonopore large, subapical on posterior surface. Paramere with distal process two-fifths total length; approximately twelve erect spines irregularly scattered on lateral and dorsal surfaces; basal process almost parallel-sided, obtuse apically.

This species is distinguished by its low, unpigmented pronotum with distinct lateral indentations and by the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, PERU: Tingo Maria, forested eastern foothills of Andes, 8.viii.1971 (*Broomfield*) (BMNH).

Paratypes. PERU: 16 ♂, 31 ♀, data as holotype, 2–14.viii.1971 (BMNH); 2 ♂, 1 ♀, Chancamayo, 21–23.vii.1960 (*Salazar*, *Ramirez*, *Young*) (NCSU, Raleigh); 1 ♂, Tingo Maria, 11.viii.1960 (*Young*) (NCSU); 1 ♀, Iquitos, 5.viii.1960 (*Young*, *Gonzalez*) (NCSU); 1 ♂, Huanuco, Huallaga River, tropical jungle, iii.1954 (*Waytkowski*) (NCSU).

Amastris funkhouseri Haviland

(Text-figs 11, 82, 202, 253, 305, 364)

Amastris funkhouseri Haviland, 1925 : 251. Holotype ♀, GUYANA (BMNH).

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·9 mm, length of pronotum 3·8 mm, maximum height of pronotum 1·2 mm, length of tegmen 3·3 mm. Female: slightly larger than male, proportionately similar, length of pronotum 3·7–4·2 mm, maximum height of pronotum 1·2–1·4 mm.

Head with vertex indistinctly and irregularly punctate; medial groove distinct basally, becoming obsolete at level of ocelli. Ocelli very prominent, slightly closer to the eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for two-fifths its length beyond lower margins of vertex, lateral margins distinct. Rostrum just reaching to hind coxae.

Pronotum three times as long as high: sides with a distinct, shallow indentation at one-quarter, one-half and three-quarters distance from metopidium to apex; apex acute, not reaching tips of tegmina. Metopidium twice as wide as high, very slightly inclined anteriorly from base, then curving posteriorly and levelling off slightly above humerals before rising again at junction with dorsum; median carina arising basally, becoming elevated at junction with dorsum. Dorsum with maximum height at one-quarter length, median carina keel-like.

Tegmen with second discoidal cell larger than each of first three apical cells, reaching costal margin between first and second apicals; fifth apical almost completely covered by pronotum; subcostal cell coriaceous over basal five-sixths, often very weakly so, also irregularly and densely punctate; veins narrow, indistinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas of tegmen dull yellow; tarsal claws pale brown; veins of tegmen pale yellow, often unpigmented; cells and apical limbus clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft directed vertically, as long as basal apodeme; numerous small spines over apical half of anterior surface; gonopore large, situated subapically on posterior surface. Paramere very large and robust; distal process two-fifths of total length; numerous small spines on lateral surface; a smaller number of long spines dorsally; basal process slender at base, spatulate apically.

This species is distinguished by the form of the pronotum, the lack of markings, and by the relatively large size of the paramere. It is closely related to, but distinct from, *sabulosa* which overlaps it geographically.

MATERIAL EXAMINED.

Holotype ♀ GUYANA: Kartabo, viii.1922 (*Haviland*) (BMNH).

BRAZIL: 1 ♂, São Paulo, v.1953 (*Fonseca*) (MZUSP, São Paulo); 2 ♀, São Paulo, Capital (*Fonseca*) (MZUSP); 1 ♀, M. Geraes, Figueira, ix.1957 (*Fonseca*) (MZUSP); 1 ♀, Muriqui, vii.1969 (*Alvarenga*) (UP, Curitiba). VENEZUELA: 2 ♀, San Esteban, 22.xi.1939 (*Anduze*) (MZUSP).

Amastris inornata sp. n.

(Text-figs 12, 86, 162, 254, 306, 359)

Length of pronotum 3·8–4·0 mm; maximum height of pronotum 1·3–1·4 mm.

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·7 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·9 mm, length of pronotum 4·0 mm, maximum height of pronotum 1·3 mm, length of tegmen 3·8 mm.

Female: unknown.

Head with vertex irregularly ridged and obscurely punctate; medial groove becoming obscure at level of ocelli. Ocelli large, prominent, slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching middle coxae.

Pronotum three times as long as maximum height; sides with a shallow and indistinct indentation at midlength and another in posterior third; apex acute, reaching to near tips of tegmina. Metopidium one and a half times as wide as high, rising dorsally from base, then curving posteriorly to smooth junction with dorsum; median carina becoming elevated near midlength. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell equal in size to second apical cell, very slightly larger than each of first and third apicals, not reaching costal margin; fifth apical cell almost completely covered by pronotum; subcostal cell coriaceous and densely punctate over basal third, medial third much more weakly coriaceous with punctation smaller and more scattered; apical limbus broad; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas of tegmen dull yellow; tegmen with veins very pale yellow, scarcely pigmented, cells and apical limbus clear hyaline.

Male genitalia with aedeagus U-shaped; shaft as long as basal apodeme, slightly expanded apically in posterior aspect; a dense cluster of small blunt spines over apical half of anterior surface; gonopore subapical on posterior surface. Paramere with distal process slightly less than one-third total length; numerous small spines on lateral and dorsal surfaces; basal process parallel-sided; apex sinuate, acutely rounded.

This species is distinguished by the presence of lateral pronotal indentations, the lack of dark pigmentation, and the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, PARAGUAY: Chaco (*Fiebrig*) (BMNH).
Paratype. PARAGUAY: 1 ♂, data as holotype (BMNH).

Amastris janae sp. n.

(Text-figs 53, 116, 177, 256, 312, 351)

Male: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·5 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·4 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·6 mm, length of pronotum 3·4 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·1 mm.

Female: unknown.

Head with vertex very finely and irregularly ridged and punctate; medial groove becoming obscure at level of ocelli. Ocelli distinct, slightly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, lateral and basal margins indistinct. Rostrum reaching hind coxae.

Pronotum with length more than three times maximum height, without lateral indentations; apex acute, not reaching tips of tegmina. Metopidium nearly twice as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising basally, becoming gradually more elevated towards junction with dorsum. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell almost as large as fourth apical cell, much larger than each of first three apicals, reaching costal margin narrowly between first and second apicals; second apical cell very small; fifth apical not completely concealed by pronotum; subcostal cell weakly coriaceous and irregularly punctate over basal third; apical limbus broad; veins narrow, distinct.

Pronotum, frontoclypeus, ventral surface of thorax, legs, abdomen, coriaceous areas and veins of tegmen, pale brownish yellow, vertex and basal area of metopidium, reddish brown; cells of tegmen clear hyaline, unmarked; tarsal claws pale brown.

Male genitalia with aedeagus U-shaped; shaft slightly longer than basal apodeme, very slender in posterior aspect, directed vertically; a dense group of small blunt spines over apical half of anterior surface; gonopore small, subapical on posterior surface. Paramere slender; distal process one-third total length; numerous scattered spines on dorsal and lateral surfaces; basal process slightly tapered, apex acute.

This species is distinguished by the area of the exposed tegmen, colour, and the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Mato Grosso, 12°50′ S 51°47′ W, gallery forest, i.x.1968 (*Richards*) (BMNH).

This specimen was collected on the Royal Society / Royal Geographical Society Xavantina / Cachimbo Expedition 1967–69.

Amastris maculata Funkhouser

(Text-figs 36, 102, 186, 255, 308, 360)

Amastris maculata Funkhouser, 1922 : 31. Holotype ♀, BRAZIL (USNM, Washington) [examined].

Length of pronotum: male 3·5–3·7 mm; maximum height of pronotum: male 1·2–1·4 mm.

Male: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·1 mm, length of pronotum 3·7 mm, maximum height of pronotum 1·4 mm, length of tegmen 3·5 mm. Female: slightly larger than male, pronotum more elevated; length of pronotum 4·0 mm, maximum height 1·5 mm.

Head with vertex very densely, irregularly and distinctly punctate; medial groove often distinct throughout. Ocelli prominent, equidistant between each other and eyes, situated on centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex; basal and lateral margins distinct. Rostrum reaching just beyond hind coxae.

Pronotum three times as long as high in males and, approximately two and a half times as long as high in females; sides without indentations; apex acutely rounded, terminating well before tips of tegmina. Metopidium nearly twice as broad as high, curving dorsally and posteriorly from base, levelling off very slightly just anterior to level of humeral angles, then rising more steeply again to junction with dorsum; median carina arising basally, distinct, low, becoming elevated near junction with dorsum. Dorsum with maximum height at one-quarter distance from metopidium to apex; median carina keel-like.

Tegmen with second discoidal cell equal in size to each of first and fourth apical cells, often reaching costal margin between first and second apicals; fifth apical not completely concealed by pronotum; subcostal cell coriaceous and distinctly punctate over basal seven-eighths; veins narrow, indistinct.

Head, central area of metopidium, ventral surfaces of thorax and abdomen, femora, and basal half of coriaceous area of subcostal cell dark brown or black; clypeus and central part of vertex often slightly paler; remainder of pronotum, coriaceous areas of tegmen other than basal half on subcostal cell, and lateral surfaces of abdomen pale yellowish; ocelli shining, yellow; cells of tegmen unpigmented; veins either pale yellow or unpigmented; tibiae yellowish brown basally, darker apically, concolorous with femora; tarsi yellowish, claws brown.

Male genitalia with aedeagus U-shaped; shaft directed vertically, as long as basal apodeme; a dense group of small spines over apical half of anterior surface; gonopore large, situated subapically on posterior surface. Paramere with distal process more than one-third total length, robust; numerous spines on lateral and dorsal surfaces; a very long spine on dorsal surface; basal process approximately parallel-sided, apex upturned.

This species is distinguished by the very distinctive dark pigmentation of the pronotum, head, and ventral surfaces; and the structure of the male genitalia.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Manaos, Flores, 7.xi.1919 (USNM, Washington).

Paratype. BRAZIL: 1 ♂, Campinas, iii.1924[?] (*Williams*) (USNM).

BRAZIL: 1 ♂, Aimoves, São Paulo, ix.1942 (*Fonseca*) (MZUSP, São Paulo). PARAGUAY: 2 ♂, S. Bernadino (*Fiebrig*) (BMNH).

This species has also been recorded from Colombia (Richter, 1942 : 409).

Amastris inermis sp. n.

(Text-figs 51, 114, 194, 257, 309, 365)

Length of pronotum: male 4·2–4·3 mm, female 4·2–4·6 mm; maximum height of pronotum: male 1·4–1·5 mm, female 1·4–1·6 mm.

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 2·0 mm, length of pronotum 4·2 mm, maximum height of pronotum 1·5 mm, length of tegmen 3·8 mm. Female: slightly larger than male, similar in proportions.

Head with vertex obscurely punctate; medial groove distinct throughout. Ocelli small, prominent, equidistant between each other and eyes, situated slightly below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, lateral and basal margins distinct. Rostrum reaching hind coxae.

Pronotum with length three times maximum height, without lateral indentations; apex acute, reaching to near tips of tegmina. Metopidium one and a half times as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising near base, low, becoming highly elevated at junction with dorsum. Dorsum with maximum height at approximately one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell extremely large, much larger than each of first three apical cells, reaching costal margin broadly between first and second apicals; fourth apical cell partially concealed by pronotum; fifth apical entirely concealed; subcostal cell weakly coriaceous and punctate over basal three-quarters; apical limbus broad; veins distinct.

Head and pronotum dull yellow, median carina narrowly edged with black and with irregular dark brown spots; tegmen with veins pale yellow; basal part of subcostal cell pale brown; apical limbus and posterior half of third apical cell dark brown; ventral surfaces of thorax, abdomen, and legs pale brown, slightly darker than pronotum; tarsi with apices slightly darker; femora with apices slightly paler.

Male genitalia with aedeagus U-shaped; shaft directed vertically, slightly longer than and approximately one-third breadth of basal apodeme in lateral aspect; a group of small blunt spines over apical half of anterior surface; gonopore subapical on posterior surface. Paramere with distal process less than half total length; twelve or more spines on dorsal and lateral surfaces; basal process approximately parallel-sided, apex slightly upturned, narrowly rounded.

This species is distinguished by the pigmentation of the pronotum and tegmen and by the proportions of the male genitalia.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Mato Grosso, 12°49′ S 51°45′ W, gallery forest, 30.xii.1968 (*Knight*) (BMNH).

Paratypes. BRAZIL: 3 ♀, data as holotype, 4.i.1969, and 16.xii.1968 (BMNH); 1 ♂, 2 ♀, Para, Belém, 1945 (*Fonseca*) (MZUSP, São Paulo); 1 ♂, 2 ♀, data as preceding (BMNH); 1 ♀, São Paulo, Stararé [?], 1928 (*Fonseca*) (MZUSP); 1 ♀, São Paulo, Campos do Jordao, 16.xii.1944 (*Lane*) (MZUSP).

The holotype was collected on the Royal Society / Royal Geographical Society Xavantina / Cachimbo Expedition 1967–69.

***Amastris sakakibarai* sp. n.**

(Text-figs 34, 97, 188, 258, 310, 348)

Length of pronotum: male 3·7–4·0 mm, female 4·2–4·4 mm; maximum height of pronotum: male 1·3 mm, female 1·4–1·5 mm.

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·45 mm, length of clypeus 0·45 mm, width of clypeus 0·45 mm, maximum width of pronotum 2·0 mm, length of pronotum 4·0 mm, maximum height of pronotum 1·3 mm, length of tegmen 3·5 mm. Female: somewhat larger than male, similar in proportion.

Head with vertex distinctly and irregularly punctate, medial groove distinct basally, becoming obscure near level of ocelli. Ocelli distinct, very slightly nearer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex; basal margins obscure. Rostrum reaching hind coxae.

Pronotum with length approximately three times maximum height, sides without indentations; apex acute, not reaching tips of tegmina. Metopidium one and a half times as wide as high; curving dorsally and posteriorly from base, levelling off very slightly above humeral angles, then rising again to smooth junction with dorsum; median carina arising near base, gradually becoming elevated towards junction with dorsum. Dorsum with maximum height at one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell as large as fourth apical cell, reaching costal margin narrowly between first and second apicals; first three apical cells smaller than second discoidal; fifth almost completely concealed by pronotum; subcostal cell coriaceous and strongly and distinctly punctate over basal five-sixths; apical limbus broad; veins distinct.

Head pale brown, mottled with darker brown punctation; pronotum pale yellow, median carina narrowly edged with black; metopidium with dark brown punctation centrally, an irregular dark brown band arising above internal angle of each eye and, gradually converging to midline at junction with dorsum; ventral surface of thorax, hind femora, basal part of coriaceous areas of tegmen adjacent to thorax, and exposed part of apical limbus dark brown; abdomen, remainder of legs, veins and posterior parts of coriaceous areas of tegmen concolorous with sides of pronotum; cells of tegmen clear hyaline, unmarked.

Male genitalia with aedeagus U-shaped; shaft distinctly longer than basal apodeme, directed vertically; a dense group of small blunt spines over apical half of anterior surface; gonopore large, subapical on posterior surface. Paramere with distal process nearly half total length;

a few short spines on lateral and dorsal surfaces; basal process with apex slightly upturned, acute.

This species is closely related to *maculata*, but is distinguished by the pigmentation on the tegmen, the proportions of the aedeagus and the arrangement and number of spines on the parameres. The degree of pigmentation on the pronotum is variable although the dark bands on the metopidium are always present to some extent.

MATERIAL EXAMINED.

Holotype ♂, BRAZIL: Barbagena, 14–15.ii.1962 (*Alvarenga*) (UP, Curitiba).

Paratypes. BRAZIL: 1 ♀, data as holotype (UP); 1 ♂, data as holotype (BMNH); 1 ♀, St Vitoria, ii.1970 (*Oliviera*) (UP); 1 ♀, St Vitoria, ii.1970 (*Oliviera*) (BMNH); 2 ♂, Para, Belem, 1948 (*Fonseca*) (MZUSP, São Paulo); 1 ♂, Para, Belem, 1948 (*Fonseca*) (BMNH); 1 ♀, São Paulo, Aadua Salles xii.1936 (*Fonseca*) (MZUSP). BOLIVIA: 1 ♀ Buena Vista, 8.iv.1950 (*Pena*) (NCSU, Raleigh). PARAGUAY: 1 ♀, S. Bernadino (*Fiebrig*) (BMNH).

Amastris compacta (Walker) **sp. rev.**

(Text-figs 64, 125, 193)

Thelia compacta Walker, 1858 : 140. Holotype ♀, BRAZIL (BMNH) [examined].

Female: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·8 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 1·9 mm, length of pronotum 4·3 mm, maximum height of pronotum 1·8 mm, length of tegmen 3·3 mm.

Male unknown.

Head with vertex almost flat, obscurely ridged and punctate, medial groove distinct basally, becoming obscure towards junction with base of frontoclypeus. Ocelli distinct, slightly nearer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for one-quarter its length beyond lower margins of vertex, margins indistinct. Rostrum reaching posterior coxae.

Pronotum slightly less than two and a half times as long as high; sides without indentations; apex reaching tips of tegmina. Metopidium slightly wider than high, rising dorsally from base to smooth junction with dorsum; median carina low basally, becoming more prominent towards dorsum. Dorsum highest above humeral angles, median carina keel-like.

Tegmen with second discoidal cell reaching costal margin between first and second apical cells; second and third apical cells small; fifth almost entirely concealed by pronotum; subcostal cell weakly coriaceous and densely punctate over basal three-quarters; apical limbus broad; veins distinct.

Head, pronotum, abdomen, coriaceous areas and veins of tegmen, and femora yellowish brown; ocelli yellow, shining; ventral surface of thorax and apices of tibiae slightly darker brown; tarsi pale yellowish brown; cells of tegmen and wing clear hyaline.

This is a medium sized species with the pronotum moderately elevated and without dark pigmentation.

This species was synonymized with *A. citrina* (Fairmaire) by Goding (1929 : 265). It has not been possible to confirm or disprove this synonymy, and *compacta* is therefore regarded as a valid species.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Santarem (*Bates*) (BMNH).

Amastris consanguinea Stål **sp. rev.**

(Text-figs 9, 135, 205)

Amastris consanguinea Stål, 1862 : 30. Holotype ♀, BRAZIL (NR, Stockholm) [examined].

Female: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·5 mm, width of clypeus 0·45 mm, maximum width of pronotum 1·8 mm, length of pronotum 4·0 mm, maximum height of pronotum 1·0 mm, length of tegmen 3·5 mm.

Male unknown.

Head with vertex almost flat, sparsely and irregularly ridged and punctate; medial groove distinct basally, becoming obsolete towards junction with frontoclypeus. Ocelli small, not prominent, slightly closer to eyes than to each other, situated just below centro-ocular line. Frontoclypeus extending little more than one-quarter its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching hind coxae.

Pronotum four times as long as high; sides with a shallow and indistinct indentation immediately posterior to humeral angles, another at midlength, and a third in posterior third; posterior apex reaching to near tips of tegmina. Metopidium twice as wide as high; curving dorsally and posteriorly from base to junction with dorsum; median carina low throughout. Dorsum with maximum height immediately anterior to midlength, smoothly rounded; median carina prominent but not elevated.

Tegmen with second discoidal cell approximately equal in size to each of first and second apical cells, not reaching costal margin; third apical cell very large; subcostal cell weakly coriaceous and weakly punctate over basal four-fifths, more heavily coriaceous and punctate over basal third. Apical limbus broad. Veins distinct.

Head, pronotum, ventral surface of thorax, abdomen, legs, coriaceous areas and veins of tegmen dull, pale brown; ocelli yellow, shining; cells of tegmen and wing clear hyaline; tarsal claws brown.

This is a medium sized species, with a very low pronotum.

This species was synonymized with *simillima* Stål by Goding (1929 : 265). However, a comparison of the types of the two species conducted during the present study has proved this synonymy to be in error. *A. consanguinea* is therefore reinstated as a valid species.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Rio de Janeiro (Stål Collection) (NR, Stockholm).

Amastris elevata Funkhouser

(Text-figs 30, 94, 165)

Amastris elevata Funkhouser, 1922 : 27. Holotype ♀, PERU (USNM, Washington) [examined].

Female: width of vertex excluding eyes 1·5 mm, width of vertex including eyes 2·4 mm, length of vertex to base of clypeus 0·55 mm, length of clypeus 0·6 mm, width of clypeus 0·6 mm, maximum width of pronotum 2·9 mm, length of pronotum 6·4 mm, maximum height of pronotum 3·2 mm, length of tegmen 4·8 mm.

Male unknown.

Head with vertex almost flat, ridged and very indistinctly punctate; medial groove very indistinct. Ocelli small, slightly nearer to eyes than to each other, situated just below centro-ocular line. Frontoclypeus extending slightly less than a quarter its length beyond lower margins of vertex; lateral margins distinct apically. Rostrum reaching mid coxae.

Pronotum twice as long as high, sides without indentations; apex reaching tips of tegmina. Metopidium slightly wider than high, inclined slightly anteriorly from base, then curving posteriorly to junction with dorsum; median carina gradually becoming highly elevated above head, very prominent and keel-like on dorsum. Dorsum with maximum height immediately posterior to humeral angles.

Tegmen with second discoidal cell approximately equal in size to second apical cell, not reaching costal margin, smaller than first apical cell; third apical cell very small; fifth completely covered by pronotum; subcostal cell weakly coriaceous and densely punctate over basal three-quarters; apical limbus broad; veins distinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, veins and coriaceous area of tegmen yellowish ochre, pronotum with median carina very narrowly edged with black; ocelli shining, concolorous with vertex; cells and apical limbus of tegmen pale smokey hyaline; tarsal claws brown.

MATERIAL EXAMINED.

Holotype ♀, PERU, Napo River, vi.1920 (USNM, Washington).

The male specimen from the same locality and labelled as 'allotype' is in fact of a different species (see *Amastris pseudoelevata* (p. 388)).

This species has been previously recorded from Guyana and Brazil (Metcalf, 1965 : 873).

Amastris panamensis **sp. n.**

(Text-figs 18, 77, 154)

Female: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·5 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·2 mm, width of clypeus 0·3 mm, maximum width of pronotum 1·5 mm, length of pronotum 3·0 mm, maximum height of pronotum 1·0 mm, length of tegmen 2·8 mm.

Male unknown.

Head with vertex very finely and densely punctate; medial groove obscure. Ocelli very small, distinct, one and a half times as far from each other as from eyes, situated on centro-ocular line. Frontoclypeus extending only slightly beyond lower margins of vertex; basal margins obscure. Rostrum extending slightly beyond hind coxae.

Pronotum with length three times maximum height, without lateral indentations; apex acute, not reaching tips of tegmina. Metopidium one and a half times as wide as high, rising dorsally from base, then curving posteriorly to smooth junction with dorsum; median carina low, becoming very gradually elevated towards dorsum. Dorsum with maximum height at one-fifth distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell approximately equal in size to third apical cell, slightly smaller than each of first and second apicals, not reaching costal margin; fifth apical cell almost completely concealed by pronotum; subcostal cell weakly coriaceous and sparsely punctate over basal seven-eighths; apical limbus broad; veins narrow, distinct.

Head, pronotum, abdomen, coriaceous areas and veins of tegmen, dull yellowish brown, ventral surface of thorax and femora dark brown; cells and apical limbus of tegmen clear hyaline.

This is a small species, distinguished by the structure of the head and by the pigmentation.

MATERIAL EXAMINED.

Holotype ♀, PANAMA: Pacora, 19.xi.1945 (*Stage*) (USNM, Washington).

Amastris arquata sp. n.

(Text-figs 13, 132, 155)

Female: width of vertex excluding eyes 0·9 mm, width of vertex including eyes 1·5 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·6 mm, length of pronotum 3·4 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·0 mm.

Male unknown.

Head with vertex finely and irregularly wrinkled, obscurely punctate; medial groove becoming obscure towards junction with clypeus. Ocelli large, prominent, nearly one and a half times as far from each other as from eyes; situated immediately above centro-ocular line. Frontoclypeus extending one-quarter its length beyond lower margins of vertex, basal margins indistinct. Rostrum reaching just beyond hind coxae.

Pronotum with length very slightly more than three times maximum height; sides very shallowly and obscurely indented at midlength; apex narrowly rounded in lateral aspect, reaching to near tips of tegmina. Metopidium nearly twice as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising above base, low, becoming elevated at junction with dorsum. Dorsum with maximum height approximately one-quarter distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell equal in area to second apical cell, larger than each of first and third apicals, reaching costal margin narrowly between first and second apicals; fifth apical entirely concealed by pronotum; subcostal cell weakly coriaceous and densely punctate over basal three-quarters; apical limbus broad; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, coriaceous areas and veins of tegmen, pale yellowish brown, cells of tegmen clear hyaline, tarsal claws brown.

This is a rather drab species with a low unmarked pronotum.

MATERIAL EXAMINED.

Holotype ♀, FRENCH GUIANA: Guyane (*Maroni*) (NCSU, Raleigh).

Amastris sulphurea sp. n.

(Text-figs 60, 128, 199)

Female: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·9 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·6 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·3 mm, length of pronotum 4·8 mm, maximum height of pronotum 1·5 mm, length of tegmen 3·8 mm.

Male unknown.

Head with vertex very finely and irregularly ridged and punctate; medial groove obsolete. Ocelli large, prominent, slightly nearer eyes than to each other, situated on centro-ocular line. Frontoclypeus extending for nearly half its length beyond lower margins of vertex, lateral and basal margins obscure. Rostrum reaching posterior coxae.

Pronotum with length slightly more than three times maximum height; sides with a shallow indentation slightly posterior to humeral angle and another at midlength between humeral angle and apex; apex acute, reaching to near tips of tegmina. Metopidium twice as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina distinct, not highly elevated. Dorsum with maximum height at slightly more than one-quarter distance from humeral angles to apex; median carina prominent but not keel-like.

Tegmen with second discoidal cell approximately equal in size to each of first and fourth apical cells, larger than each of second and third apicals, not reaching costal margin; fifth apical cell not entirely covered by pronotum; subcostal cell weakly coriaceous and punctate over basal three-quarters; apical limbus broad; veins distinct.

Head, pronotum, ventral surface of thorax, legs, abdomen, and veins and coriaceous areas of tegmen pale yellow, a distinct white band on pronotum along each lower lateral margin a short distance posterior to humeral angle and extending halfway to posterior apex; tegmen with veins pale brown, cells and limbus pale yellow hyaline; tarsal claws pale brown.

This species is distinguished by its low pronotum with lateral indentations; and by the distinct pale lateral markings.

MATERIAL EXAMINED.

Holotype ♀, PERU: Callanga, Paucartambo, Cusco, 19.ii.1952 (*Waytkowski*) (NCSU, Raleigh).

Amastris revelata sp. n.

(Text-figs 5, 83, 153)

Both specimens the same size.

Female: width of vertex excluding eyes 1·3 mm, width of vertex including eyes 2·1 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·6 mm, width of clypeus 0·6 mm, maximum width of pronotum 2·3 mm, length of pronotum 4·5 mm, maximum height of pronotum 1·5 mm, length of tegmen 4·3 mm.

Male unknown.

Head with vertex densely and distinctly punctate; medial groove distinct basally. Ocelli small, distinct, equidistant between each other and eyes, situated immediately below centro-ocular line. Frontoclypeus extending for less than one-third its length beyond lower margins of vertex, basal margins obscure. Rostrum reaching hind coxae.

Pronotum with length slightly greater than three times maximum height, without lateral indentations; apex acute, not reaching tips of tegmina. Metopidium wider than high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina gradually becoming elevated towards dorsum. Dorsum with maximum height at one-fifth distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell as large as fourth apical cell, very much larger than each of first three apical cells, reaching costal margin broadly between first and second apicals; subcostal cell weakly coriaceous and strongly yet sparsely punctate over basal three-quarters; apical limbus broad; veins narrow, distinct.

Sides of pronotum and abdomen, coriaceous part of anal area and veins of tegmen pale greenish yellow; median carina sometimes with irregular pale brown spots; metopidium with either a dark brown mark above internal angle of each eye extending to supra-ocular callosity, or an irregular broad brown stripe extending from base above internal angle of each eye to midline slightly below junction with dorsum, median carina pale brown basally; head yellowish, vertex irregularly mottled with brown, lower lateral margins narrowly edged with black; ventral surface of thorax, and femora dark brown, almost black; basal part of subcostal cell, tibiae, and tarsi paler brown; ventral surface of abdomen dull brown; tegmen with cells clear hyaline, apical limbus pale brownish.

This species has the pronotum only moderately elevated and is distinguished by the contrast between the very dark pigmentation of the ventral surfaces and the bright greenish yellow of the pronotum. The markings on the metopidium, though variable, are also distinctive.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Jatai, Goiás, xi.1972 (*Oliveira*) (BMNH).
Paratype. BRAZIL: 1 ♀, data as holotype (BMNH).

Amastris sabulosa Funkhouser

(Text-figs 45, 105, 196)

Amastris sabulosa Funkhouser, 1922 : 29. Holotype ♀, BRAZIL (USNM, Washington) [examined].

Female: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·5 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·8 mm, length of pronotum 3·4 mm, maximum height of pronotum 1·1 mm, length of tegmen 2·8 mm.

Male unknown.

Head with vertex obscurely ridged and punctate; medial groove distinct throughout. Ocelli large, very prominent, closer to eyes than to each other, situated below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, lateral and basal margins distinct. Rostrum reaching hind coxae.

Pronotum with length three times maximum height, sides with a shallow indentation immediately posterior to humeral angles, another at midlength and a third in posterior third; apex acute, reaching to near tips of tegmina. Metopidium nearly twice as wide as high, curving dorsally and posteriorly from base, levelling off very slightly above humerals, then gradually rising again to smooth junction with dorsum; median carina prominent, becoming elevated where curvature of metopidium levels off. Dorsum with maximum height at approximately one-third distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell larger than any of first three apical cells, approximately equal in size to fourth apical cell, reaching costal margin between first and second apicals; fifth apical cell not entirely concealed by pronotum; subcostal cell weakly coriaceous and densely punctate over basal six-sevenths; apical limbus broad; veins prominent.

Head and dorsum indistinctly mottled with yellow and brown; metopidium dull, yellowish brown with an indistinct brownish band on each side from base above internal margin of eyes, to midline immediately anterior to junction with dorsum; median carina of dorsum with scattered dark brown spots; ventral surface of thorax, abdomen, femora, coriaceous areas and majority of veins of tegmen yellowish brown; veins of first, second and third apical cells adjacent to costal margin, and branches of radial vein brown; cells and apical limbus clear hyaline; tibiae with apices dark brown; tarsi of middle and hind legs dark brown, almost black.

This species is distinguished by the proportions and mottled pigmentation of the pronotum. The male is unknown, the allotype being a different species to the holotype.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Flores, Manaos, 7.xi.1919 (USNM, Washington).

Amastris straminea **sp. n.**

(Text-figs 6, 84, 146)

Length of pronotum 4·3–4·6 mm, maximum height of pronotum 1·8–2·0 mm.

Female: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·9 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·6 mm, maximum width of pronotum 2·0 mm, length of pronotum 4·6 mm, maximum height of pronotum 1·9 mm, length of tegmen 3·9 mm.

Male unknown.

Head with vertex finely and irregularly ridged and punctate, medial groove distinct throughout. Ocelli prominent, distinctly closer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending for one-third its length beyond lower margins of vertex, lateral and basal margins distinct. Rostrum reaching hind coxae.

Pronotum with length two and a half times maximum height, without lateral indentations; apex acute, reaching or very nearly reaching tips of tegmina. Metopidium very slightly wider than high, inclined anteriorly above head, curving dorsally and posteriorly to smooth junction with dorsum; median carina gradually becoming highly elevated at midlength. Dorsum with maximum height at approximately one-seventh distance from humeral angles to apex; median carina keel-like.

Tegmen with second discoidal cell larger than fourth apical cell, much larger than each of first three apicals, reaching costal margin narrowly between first and second apicals; second apical very small; third apical transverse; fifth apical cell larger than all other apical cells and second discoidal together; subcostal cell very weakly coriaceous and irregularly punctate over basal five-sixths; apical limbus broad; veins distinct.

Head, pronotum, abdomen, coriaceous areas and veins of tegmen pale yellowish; ventral surface of thorax, femora and tibiae dark reddish brown; tarsi slightly paler, claws dark brown; cells and apical limbus of tegmen clear hyaline.

This species is distinguished by the highly elevated pronotum, the unpigmented median carina and the distinct darker coloration of the ventral surface of the thorax and legs.

MATERIAL EXAMINED.

Holotype ♀, NICARAGUA: Puerto Cabezas, Zelaya, 4–5.viii.1970 (*Rolston*) (LSU, Baton Rouge).

Paratypes. NICARAGUA: 1 ♀, data as holotype (LSU); 1 ♀, data as holotype (BMNH).

Amastris fallax Stål **sp. rev.**

(Text-figs 8, 89, 156)

Amastris fallax Stål, 1860 : 30. Holotype ♀, BRAZIL (NR, Stockholm) [examined].

Female: width of vertex excluding eyes 1·4 mm, width of vertex including eyes 2·1 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·3 mm, length of pronotum 5·2 mm, maximum height of pronotum 1·6 mm, length of tegmen 4·7 mm.

Male unknown.

Head with vertex weakly and irregularly punctate, medial groove distinct. Ocelli small, indistinct, closer to the eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending one-quarter its length beyond lower margins of vertex, lateral and basal margins distinct. Rostrum reaching to hind coxae.

Pronotum more than three times as long as high; sides with a shallow indentation immediately posterior to humeral angle, another at midlength and a third in posterior quarter; apex acute, not reaching tips of tegmina. Metopidium more than twice as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising basally, low, becoming elevated just prior to junction with dorsum. Dorsum highest at one-third distance from head to posterior apex; median carina keel-like.

Tegmen with second discoidal cell about equal in size to each of second and third apical cells, not reaching costal margin; first apical larger; subcostal cell very weakly coriaceous and punctate over basal half; veins distinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, and coriaceous areas and veins of tegmen pale yellowish brown; median carina on dorsum darker brown; tegmen pale smoky brown on exposed part of apical limbus; ocelli concolorous with vertex.

The species is distinguished by the low pronotum with lateral indentations and smoothly rounded profile; and by the small; indistinct ocelli.

This species was synonymized with *compacta* Walker by Funkhouser (1927 : 302); however, a comparison of the types of the two species conducted in the present study proved this synonymy to be incorrect; *fallax* is therefore reinstated as a valid species.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Rio de Janeiro (*Sahlb.*) (NR, Stockholm).

Amastris peruviana Funkhouser

(Text-figs 50, 112, 183)

Amastris peruviana Funkhouser, 1940 : 286. Holotype ♀, PERU (USNM, Washington) [examined].

Female: width of vertex excluding eyes 1·5 mm, width of vertex including eyes 2·7 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·5 mm, width of clypeus 0·6 mm, maximum width of pronotum 3·2 mm, length of pronotum 6·4 mm, maximum height of pronotum 2·8 mm, length of tegmen 5·0 mm.

Male unknown.

Head with vertex obscurely punctate; medial groove indistinct. Ocelli small, distinct, equidistant between each other and from eyes, situated well below centro-ocular line. Frontoclypeus extending for less than one-quarter its length beyond lower margins of vertex, basal and lateral margins indistinct. Rostrum just reaching to hind coxae.

Pronotum approximately two and one-third times as long as high; sides without indentations; apex acute, reaching tips of tegmen. Metopidium nearly as high as wide, rising vertically above head, then curving posteriorly to smooth junction with dorsum; median carina low and indistinct near base, becoming highly elevated towards junction with dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina keel-like.

Tegmen with second discoidal cell smaller than each of first and second apical cells, not reaching costal margin; third apical cell very small; fifth apical almost completely concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal five-sixths; veins distinct basally, rather obscure towards apex.

Head, pronotum, ventral surfaces of thorax, abdomen, legs, and veins and coriaceous areas of tegmen dull, pale yellowish brown; cells of tegmen pale brownish hyaline, apical half of second apical, whole of third apical, and adjacent area of apical limbus darker.

This species, known only from the holotype, has the pronotum highly elevated and the tegminal pigmentation distinctive.

MATERIAL EXAMINED.

Holotype ♀, PERU: San Martin, viii.1936 (USNM, Washington).

Amastris projecta Funkhouser

(Text-figs 47, 111, 185)

Amastris projecta Funkhouser, 1922 : 28. Holotype ♀, PERU (USNM, Washington) [examined].

Female: width of vertex excluding eyes 1·4 mm, width of vertex including eyes 2·4 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 3·2 mm, length of pronotum 6·8 mm, maximum height of pronotum 2·8 mm, length of tegmen 5·8 mm.

Male unknown.

Head with vertex obscurely punctate; median groove indistinct. Ocelli small, distinct, slightly nearer to eyes than to each other, situated immediately below centro-ocular line. Frontoclypeus extending one-quarter its length beyond lower margins of vertex; basal and internal margins indistinct. Rostrum reaching hind coxae.

Pronotum nearly two and a half times as long as high; sides without indentations; apex acute, reaching tips of tegmina. Metopidium nearly as high as wide, inclined slightly anteriorly above head, then curving posteriorly to smooth junction with dorsum; median carina low basally, becoming abruptly highly elevated at midlength to junction with dorsum. Dorsum with maximum height immediately posterior to humeral angles; median carina very highly elevated, keel-like for two-thirds distance to posterior apex, then distinctly lower.

Tegmen with second discoidal cell approximately equal in size to each of first and second apical cells; third apical cell much smaller; fifth apical not entirely concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal two-thirds; veins distinct.

Head, pronotum, ventral surfaces of thorax, abdomen, and veins and coriaceous area of tegmen dull yellow, median carina of pronotum narrowly edged with black; legs dull yellow, apices of tibiae brownish; tegmen smoky hyaline.

This species is rather similar to *peruviana* but differs in the development of the median carina of the pronotum and the lack of tegminal pigmentation. The holotype is the only specimen available for study.

MATERIAL EXAMINED.

Holotype ♀, PERU: no other data (USNM, Washington).

Amastris simillima Stål

(Text-figs 62, 120, 192)

Amastris simillima Stål, 1862 : 30. Holotype ♀, BRAZIL (NR, Stockholm) [examined].

Female: width of vertex excluding eyes 1·2 mm, width of vertex including eyes 1·9 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·5 mm, maximum width of pronotum 2·2 mm, length of pronotum 4·3 mm, maximum height of pronotum 1·4 mm, length of tegmen 4·0 mm.

Male unknown.

Head with vertex indistinctly and irregularly ridged and punctate; median groove indistinct. Ocelli small, indistinct, slightly nearer to the eyes than to each other, situated on centro-ocular line. Frontoclypeus extending two-fifths its length beyond lower margins of vertex, internal margins obscure. Rostrum reaching hind coxae.

Pronotum three times as long as high; sides with a shallow but distinct indentation immediately posterior to humeral angles, another at midlength, and a third in posterior third; apex acute, not reaching tips of tegmina. Metopidium nearly twice as wide as high; broadly rounded dorsally and posteriorly from base, levelling off slightly immediately posterior to level of humeral angles, then rising again to junction with dorsum; median carina low throughout. Dorsum with maximum height at middistance between anterior surface of metopidium and apex of pronotum; median carina prominent, not keel-like.

Tegmen with second discoidal cell as large as third apical cell, larger than first apical and much larger than second apical; reaching costal margin between first and second apical cells; fifth apical entirely concealed by pronotum; subcostal cell coriaceous and punctate over basal three-quarters, heavily and densely so over basal fifth; apical limbus very narrow, veins distinct.

Head, pronotum, ventral surfaces of thorax and legs, abdomen, coriaceous areas and veins of tegmen pale yellowish brown; tarsal claws slightly darker; cells of tegmen clear hyaline.

This species differs from the closely related *funkhouseri* in the very narrow apical limbus of the tegmen, the more acute posterior apex of the pronotum, the more rounded metopidium, and the very much smaller ocelli. It differs from *specialis* and *undulata* in lacking dark pigmentation on the pronotum and in the structure of the tegminal venation. The holotype is the only specimen available for study.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Rio de Janeiro (*Sahlb.*) (NR, Stockholm).

The species has also been recorded from Peru, Colombia and Venezuela (Metcalf 1965 : 876). However, these records are doubtful as specimens have often been wrongly determined as this species.

Amastris discreta sp. n.

(Text-figs 61, 124, 204)

Female: width of vertex excluding eyes 1·0 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·4 mm, length of clypeus 0·4 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·8 mm, length of pronotum 3·7 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·5 mm.

Male unknown.

Head with vertex finely and obscurely punctate; medial groove obsolete. Ocelli small, indistinct, much closer to eyes than to each other, situated on centro-ocular line. Frontoclypeus extending one-third its length beyond lower margins of vertex; basal and lateral margins indistinct. Rostrum reaching beyond hind coxae.

Pronotum with length more than three times height; sides with shallow indentation immediately posterior to humeral angles and again at midlength; apex acute, not reaching tips of tegmina. Metopidium nearly twice as wide as high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising immediately above head, low and distinct, becoming more prominent towards junction with dorsum. Dorsum with maximum height approximately one-third distance from humeral angle to apex; median carina keel-like.

Tegmen with second discoidal and fourth apical cells extremely large, both much larger than each of first three apical cells; the former reaching costal margin broadly between first and second apicals; fifth apical cell not completely concealed by pronotum; subcostal cell coriaceous and punctate over basal five-sixths; apical limbus broad; veins distinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, veins and coriaceous areas of tegmen pale brownish yellow; basal half of tegmen semiopaque, pale brownish, separated from clear hyaline apical half by an indistinct transverse, slightly darker brown band, from apical sixth of subcostal cell to apex of vannal fold; veins bounding posterior margins of third and fourth apical cells also brownish.

This species, described from a unique female, is distinguished by the proportions of the pronotum and the tegminal pigmentation.

MATERIAL EXAMINED.

Holotype ♀, BRAZIL: Mato Grosso, 12°50′ S 51°45′ W, gallery forest, 15.ii.–8.iii. 1968 (*Freeman*) (BMNH).

This specimen was collected on the Royal Society / Royal Geographical Society Xavantina / Cachimbo Expedition 1967–69.

Amastris lycioda Ball

(Text-figs 42, 110, 180, 223, 274, 329)

Amastris lycioda Ball, 1933 : 27. Holotype ♀, U.S.A. (USNM, Washington) [examined].

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·5 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·9 mm, length of pronotum 3·5 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·0 mm.

Female: somewhat larger, pronotum more highly elevated; pronotal length 4·1 mm, maximum height 1·6 mm.

Head with vertex densely and obscurely punctate; medial groove distinct basally, becoming obscure towards base of clypeus. Ocelli distinct, slightly closer to each other than to eyes, situated on centro-ocular line. Frontoclypeus extending for approximately one-third its length beyond lower margins of vertex, lateral margins distinct. Rostrum reaching posterior coxae.

Pronotum two and a half (♀) or three times (♂) as long as high, sides without indentations; apex acute, reaching tips of tegmina (♀) or terminating some distance before (♂). Metopidium much wider than high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising near base, distinct but not highly elevated. Dorsum with maximum height at midlength; median carina prominent but not keel-like.

Tegmen with second discoidal cell approximately as large as each of first three apical cells, not reaching costal margin; fifth apical completely concealed by pronotum; subcostal cell weakly coriaceous and punctate over basal three-quarters; veins indistinct.

Head, pronotum, abdomen, ventral surfaces of thorax, legs, and coriaceous areas and veins of tegmen dull, pale brownish yellow; margins of vertex pale brown; cells of tegmen clear.

Male genitalia robust; aedeagus U-shaped; shaft shorter than basal apodeme, directed vertically; a subapical circle of approximately twelve spines on anterior surface, two very acutely pointed, remainder blunt. Paramere with distal process slightly less than half total length, apex very broadly recurved; approximately twelve spines on dorsal, lateral and posterior surfaces; basal process broad, spatulate.

The degree of sexual dimorphism in this species, although slight, is exceptional for the genus. The species is distinguished from the other North American species, *templa*, by the acute posterior apex to the pronotum and the arrangement of the spines on the shaft of the aedeagus.

MATERIAL EXAMINED.

Holotype ♀, U.S.A.: Arizona, Tucson, 24.vii.1930 (*Ball*) (USNM, Washington).
Paratype. U.S.A.: 1 ♂, data as holotype (USNM).

Amastris templa Ball

(Text-figs 40, 108, 176, 252, 307, 362)

Amastris templa Ball, 1933 : 27. LECTOTYPE ♂, U.S.A. (USNM, Washington), here designated [examined].

Length of pronotum: male 3·5–3·7 mm, female 4·2 mm; maximum height of pronotum: male 1·0–1·1 mm, female 1·4 mm.

Male: width of vertex excluding eyes 1·1 mm, width of vertex including eyes 1·6 mm, length of vertex to base of clypeus 0·5 mm, length of clypeus 0·5 mm, width of clypeus 0·4 mm, maximum width of pronotum 1·8 mm, length of pronotum 3·6 mm, maximum height of pronotum 1·1 mm, length of tegmen 3·2 mm.

Head with vertex distinctly and densely punctate, medial groove distinct basally, becoming obscure towards base of clypeus. Ocelli small, not prominent, very slightly closer to eyes than to each other, situated very slightly below centro-ocular line. Frontoclypeus extending one-third its length beyond lower margins of vertex, lateral margins distinct. Rostrum reaching to hind coxae.

Pronotum with length more than three times maximum height; without lateral indentations; posterior apex rounded in lateral profile, terminating some distance before tips of tegmina. Metopidium much wider than high, curving dorsally and posteriorly from base to smooth junction with dorsum; median carina arising near base, not highly elevated. Dorsum highest at mid-length; median carina not keel-like, distinct.

Tegmen with second discoidal cell approximately equal in area to each of first and second apical cells, larger than third apical, not reaching to costal margin; fifth apical entirely concealed by pronotum; subcostal cell over basal sixth-sevenths its length, and sub-basal and basal area of basal cells, coriaceous and punctate; veins on basal region indistinct.

Head, pronotum, abdomen, coriaceous areas and veins of tegmen, and tarsi pale yellowish brown; ventral surfaces of thorax, and femora dark brown; cells and apical limbus of tegmen unpigmented.

Genitalia extremely robust. Aedeagus U-shaped; shaft as long as, and almost as broad as basal apodeme in lateral aspect, slender in posterior aspect with apex expanded, with a dense cluster of small spines over subapical half of anterior surface; gonopore large, subapical on posterior surface; basal apodeme almost parallel-sided basally in lateral aspect, tapering apically. Paramere with distal process less than half total length, apex broadly recurved, with scattered small spines on lateral and dorsal surfaces; basal process very broad, almost parallel-sided, apex obtuse.

This species may be distinguished from the other North American representative of the genus, *lycioda*, by the rounded posterior apex to the pronotum and the very distinctive male genitalia. The aedeagus is extremely large in this species in relation to the size of the insect.

MATERIAL EXAMINED.

Lectotype ♂, U.S.A.: Utah, St George, 17.v.1913 (*Ball*) (USNM, Washington).
Paralectotypes: U.S.A.: 1 ♂, 1 ♀, same data as lectotype (USNM).

The three above mentioned specimens are glued to the same card and the specimen here designated as lectotype is indicated by an adjacent red ink spot. There are eight further paralectotypes in the type-series but these were not examined.

NOMINA DUBIA

Amastris citrina (Fairmaire)

Thelia citrina Fairmaire, 1846 : 309. Number and sex of specimens unknown, COLOMBIA (presumed lost).
Amastris citrina (Fairmaire) Goding, 1929 : 264.

The original description reads as follows:

'Length 4·0 mm. Elevata, compressa, flavescens. Forme de la précédente espèce [*Thelia antica* Germar]; très ponctuée, d'un jaune légèrement verdâtre; base des élytres jaune verdâtre; pattes testacées. – Coll. du Muséum.'

There are three specimens in the collection of the museum referred to in the description (MNHN, Paris) which have been regarded as the type-series of this species. One of these specimens bears the label 'Thelia; citrina?; Fairmaire; Venezuela'. However, in view of the fact that the species was described from specimens collected in Colombia, and that the specimens in question are of *Stegaspis viridis* Funkhouser, it is thought best to regard Fairmaire's type-material as being lost.

If it could be proved that the Paris specimens are in fact Fairmaire's type-series of *citrina* (and they, like many other species, fit the inadequate description well enough) then the species would have to be moved to *Stegaspis* Germar, 1833, with the reduction of Funkhouser's specific name to the status of a junior synonym. It is, however, very doubtful if these are Fairmaire's specimens, since he is unlikely to have confused *Thelia* with *Stegaspis*, a genus in which he himself also described a species. On this basis the identity of *Amastris citrina* is inconclusive.

This species was synonymized with *Amastris obtegens* (Fabricius) by Funkhouser (1927 : 303). It has not been possible to confirm or disprove this synonymy.

Amastris antica (Germar)

Membracis antica Germar, 1821 : 16. Number and sex of specimens unknown, BRAZIL [not examined].
Membracis peltata Stoll, 1788 : 61. Number and sex of specimens unknown, SURINAM [not examined].
Hemiptycha antica (Germar) Burmeister, 1835 : 140.
Thelia antica (Germar) Fairmaire, 1846 : 308.
Amastris antica (Germar) Funkhouser, 1927 : 302.

The original description reads as follows:

'Der Scheitel stumpfwinklich dreieckig, punktirt. Der Panzer hinten dachförmig, zusammengedrückt, vorn abgeplattet, im Profil halbkreisförmig, die vordere Ecke abgerundet, die Oberfläche fein punktirt, mit durchlaufender Mittelkante, aber ohne Adern, die Deckschilde über die Hälfte verdeckt, ganz häutig, nur an der Wurzel des Aussenrandes etwas punktirt. Die Farbe ockergelb, der Kopf dunkler, die Schenkel in der Mitte braun. Die Deckschilde dunkel weingelb, mit braunen Adern. Am vordern platten Theile des Panzers ein caffeebrauner, dreieckiger schwefelgelb begränzter Fleck, dessen Spitze in der grössten Höhe der durchaus braunen Längskante ausläuft. Der Seitenrand des Schildchens ist schwefelgelb schmal eingefasst.'

It has not been possible to examine the type-material of this species, and though specimens of *Amastris exaltata* Walker have been determined by Funkhouser as *antica*, a possible syonymy is unproved, as also are the synonymies with *flavifolia* and *obtegens* proposed by Goding (1929 : 265).

According to Metcalf (1965 : 872), *antica* has been recorded from Surinam, Brazil, Ecuador, Colombia, Venezuela, Panama, Mexico, Guyana and Peru. However, these records must be regarded as doubtful due to the uncertainty of the identity of the species.

SPECIES TRANSFERRED FROM *AMASTRIS*

Adippe inaequalis Fowler

Adippe inaequalis Fowler, 1896 : 136. Lectotype ♀, Panama (BMNH) [examined].
Amastris pacifica Funkhouser, 1943 : 478. Holotype ♀, Guatemala (USNM, Washington) [examined]. **Syn. n.**

An examination of the holotype of *Amastris pacifica* Funkhouser has shown it to be a junior synonym of *Adippe inaequalis* Fowler. The name *pacifica* is therefore no longer valid for a species of *Amastris*.

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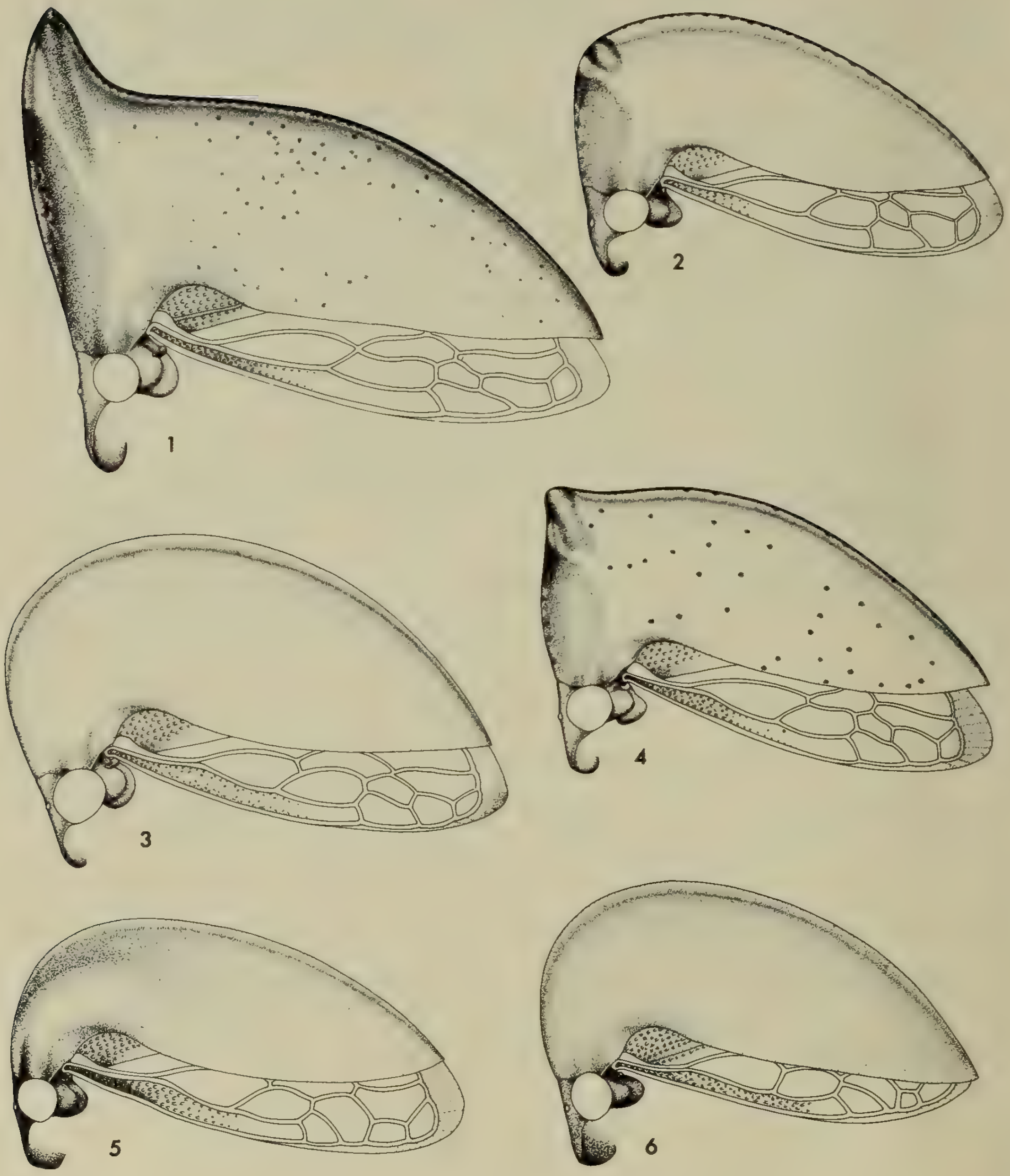
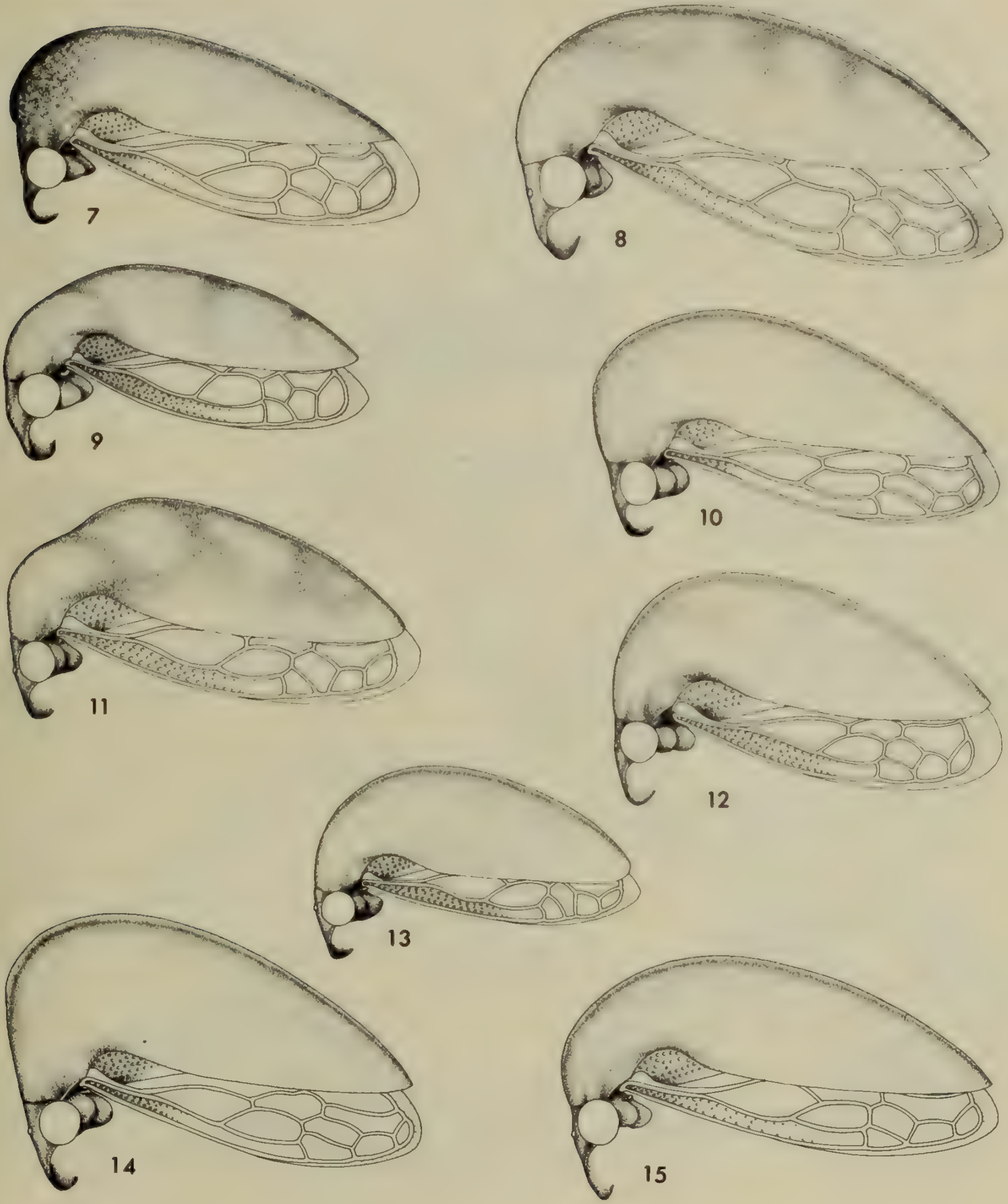
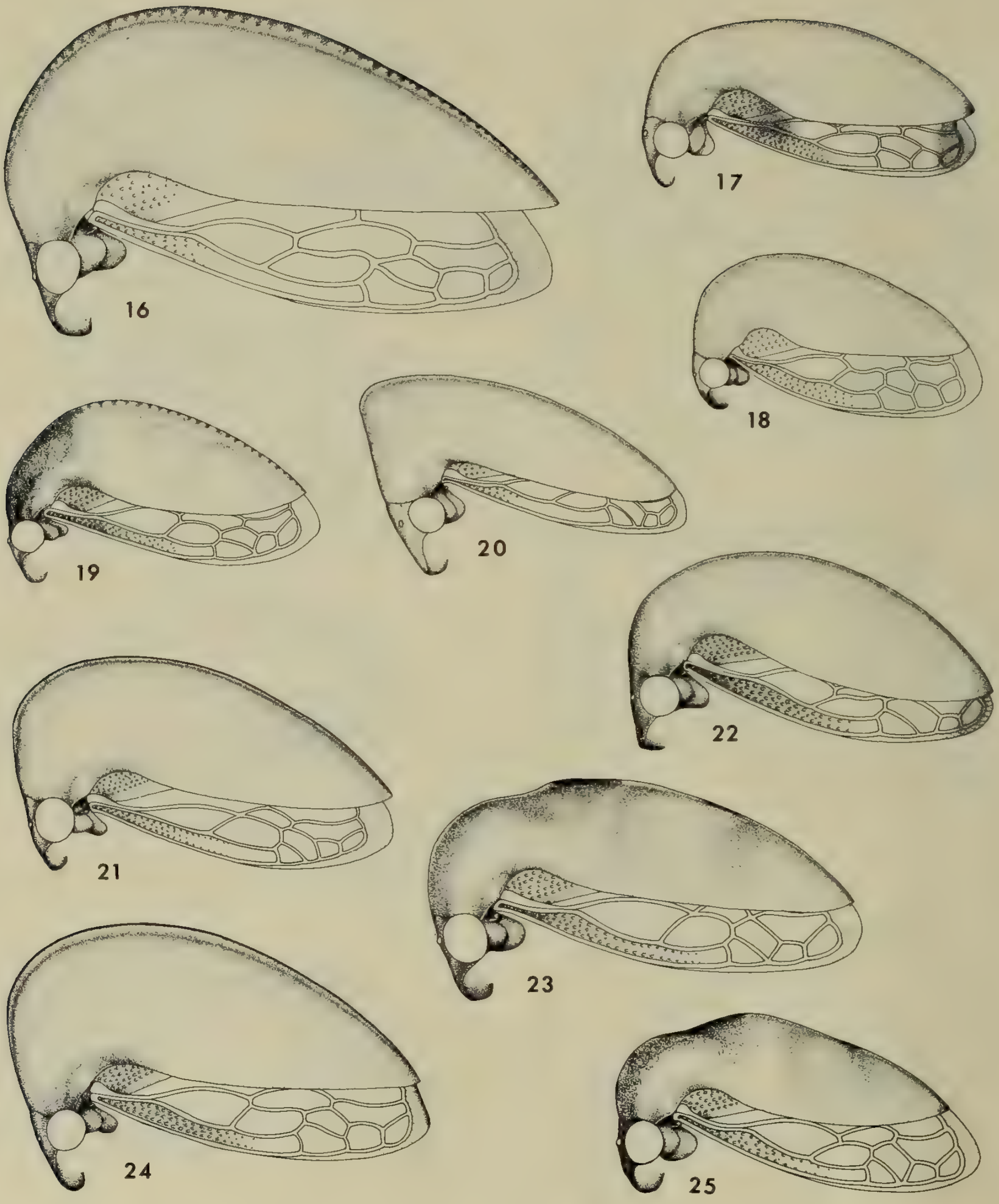


Figs 1–6. Lateral view of *Amastris* species. 1, *exaltata;* 2, *subangulata;* 3, *flavifolia;* 4, *angulata;* 5, *revelata;* 6, *straminea.*



FIGS 7–15. Lateral view of *Amastris* species. 7, *conspicua;* 8, *fallax;* 9, *consanguinea;* 10, *finitima;* 11, *funkhouseri;* 12, *inornata;* 13, *arquata;* 14, *vicina;* 15, *affinis.*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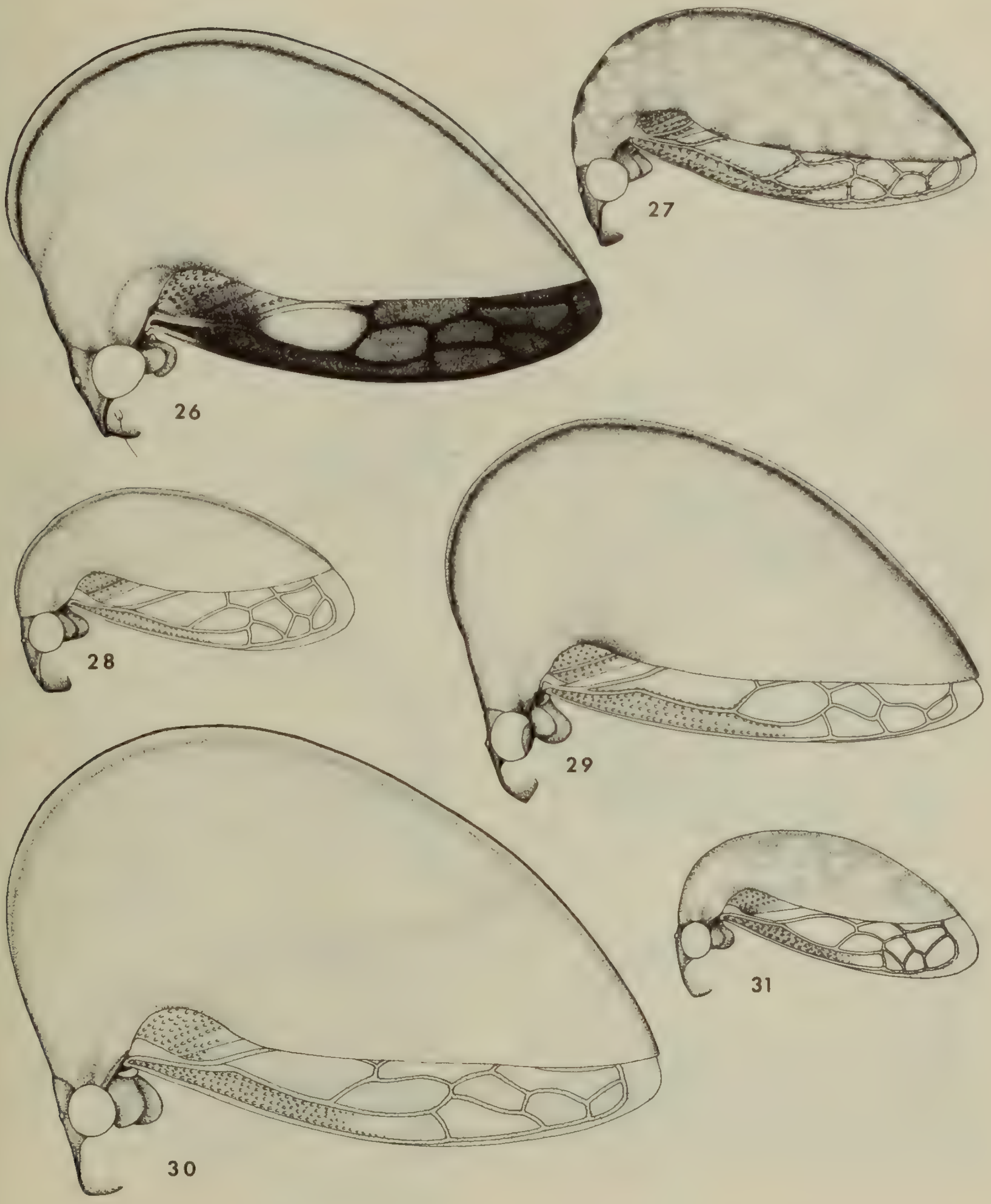
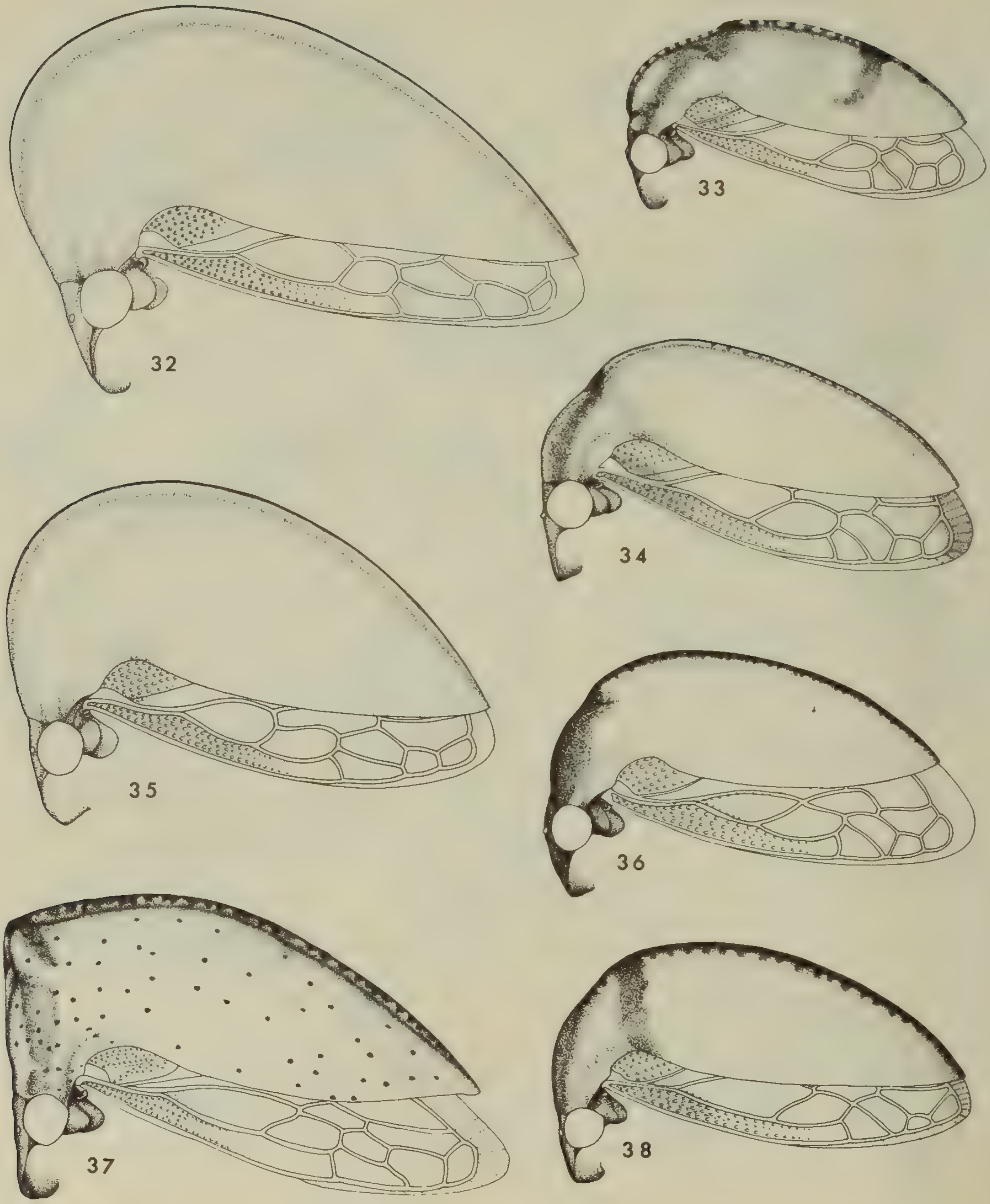
Figs 16–25. Lateral view of *Amastris* species. 16, *robusta;* 17, *fonsecai;* 18, *panamensis;* 19, *pseudomaculata;* 20, *inclinata;* 21, *unica;* 22, *froeschneri;* 23, *specialis;* 24, *vitallina;* 25, *undulata.*



FIGS 26–31. Lateral view of *Amastris* species. 26, *obtegens;* 27, *guttata;* 28, *reclusa;* 29, *vismiae;* 30, *elevata;* 31, *viridisparsa.*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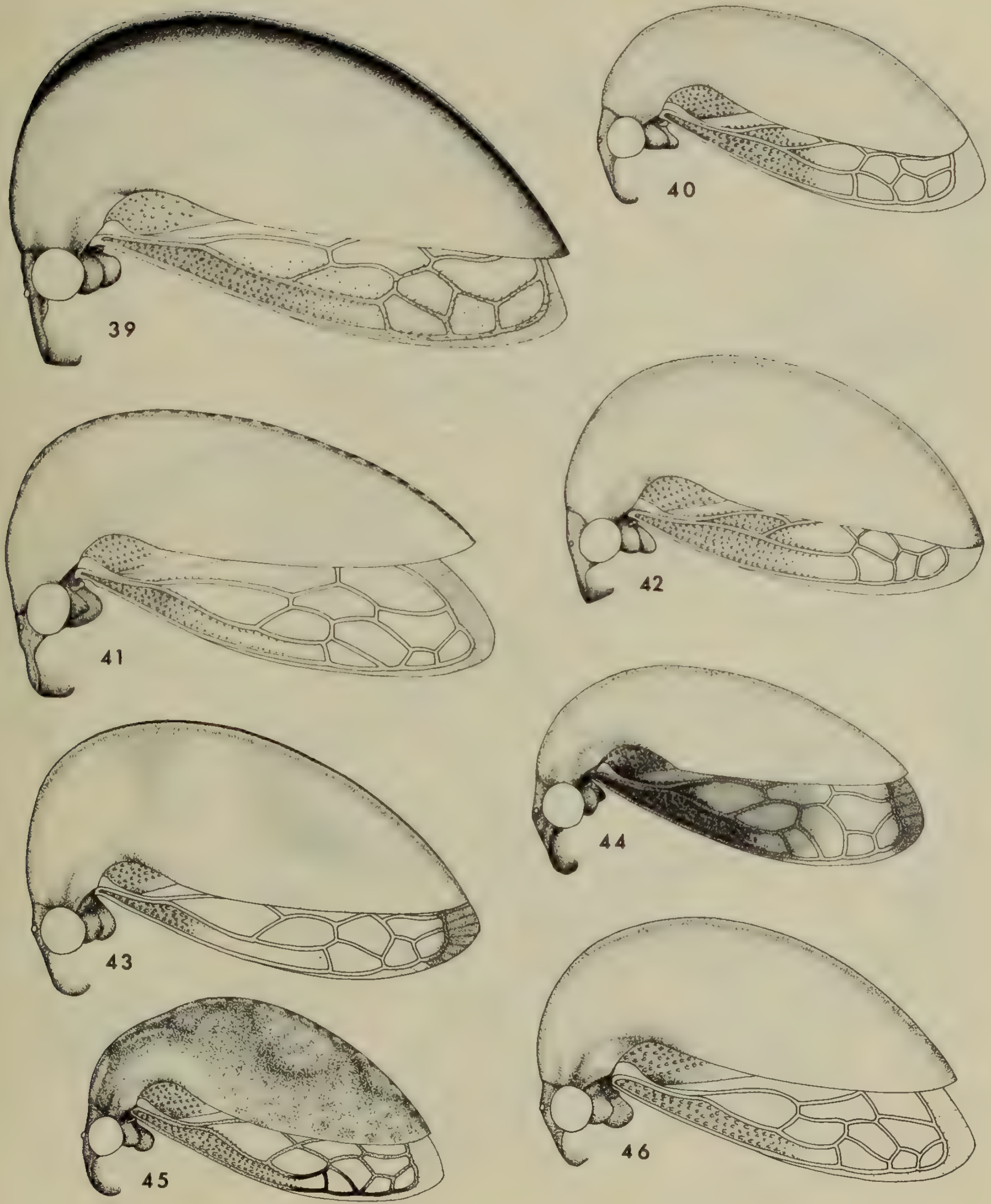
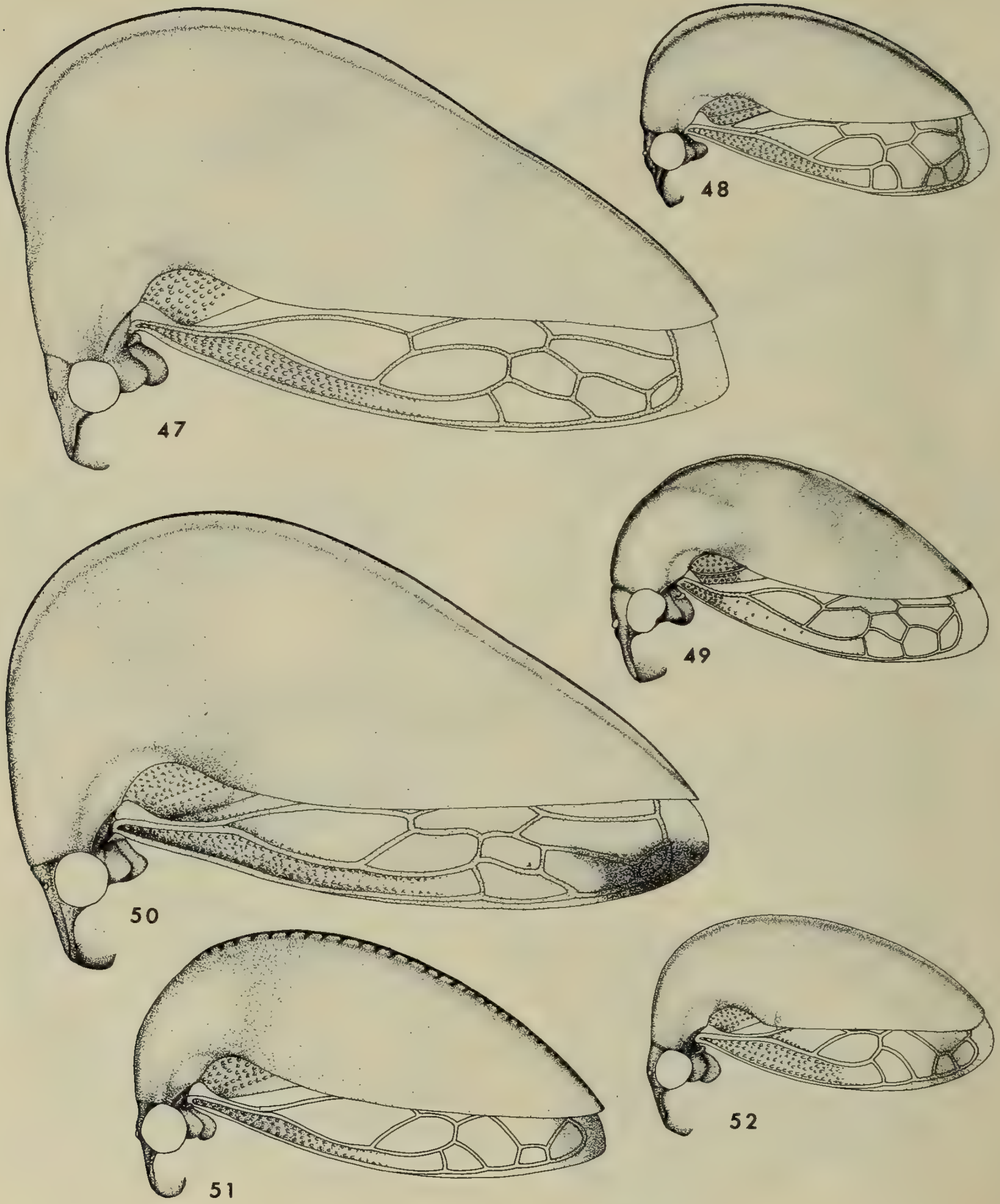
FIGS 32–38. Lateral view of *Amastris* species. 32, *concolor*; 33, *notata*; 34, *sakakibarai*; 35, *ramosa*; 36, *maculata*; 37, *punctata*; 38, *fasciata*.



FIGS 39–46. Lateral view of *Amastris* species. 39, *alapigmentata;* 40, *templa;* 41, *flava;* 42, *lycioda;* 43, *dissimilis;* 44, *brunneipennis;* 45, *sabulosa;* 46, *deplumis.*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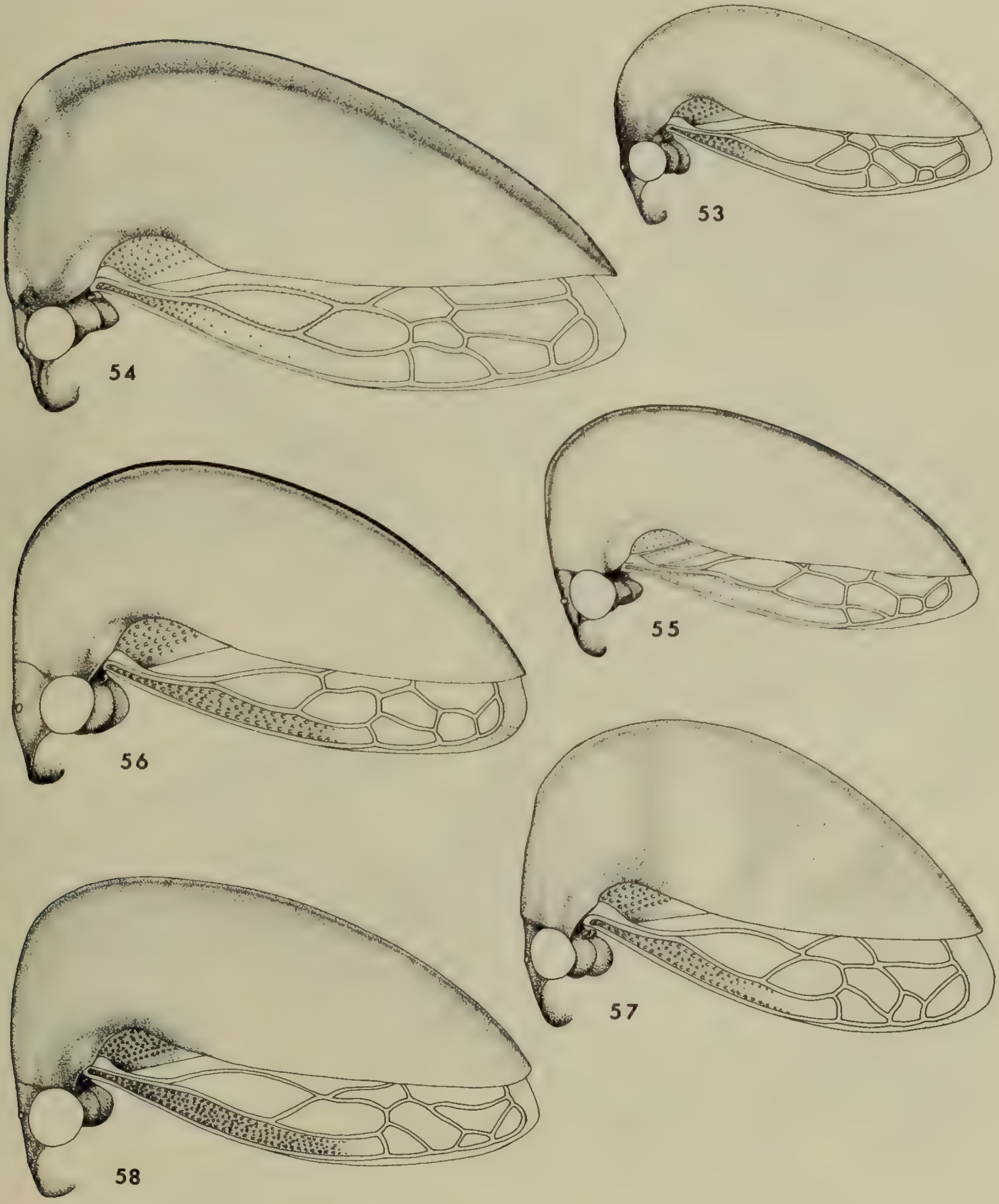
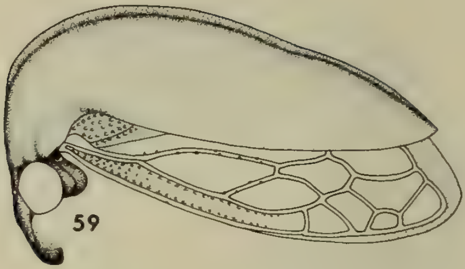
Figs 47–52. Lateral view of *Amastris* species. 47, *projecta;* 48, *exigua;* 49, *dama;* 50, *peruviana;* 51, *inermis;* 52, *minuta.*



Figs 53–58. Lateral view of *Amastris* species. 53, *janae;* 54, *pseudoelevata;* 55, *knighti;* 56, *interstincta;* 57, *evexa;* 58, *obscura.*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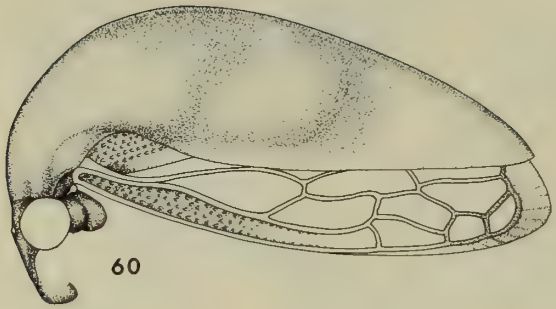
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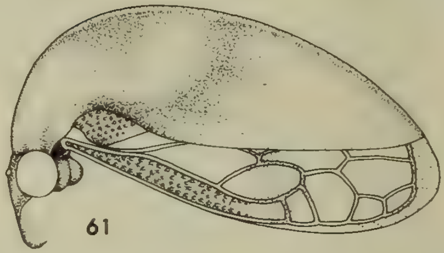
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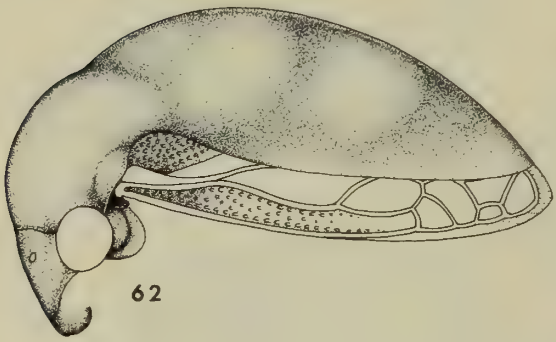
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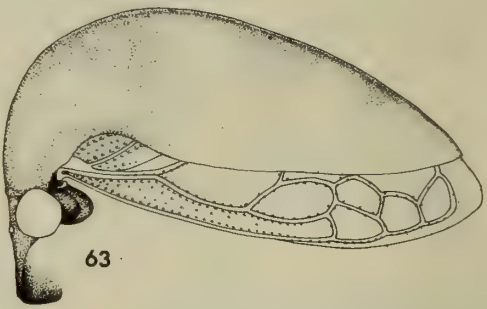
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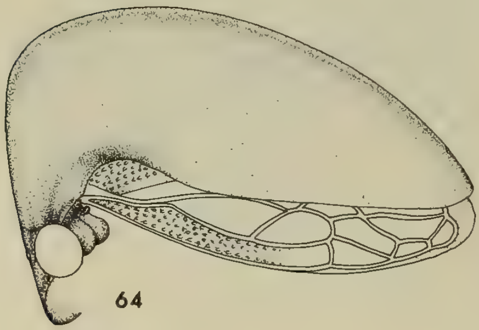
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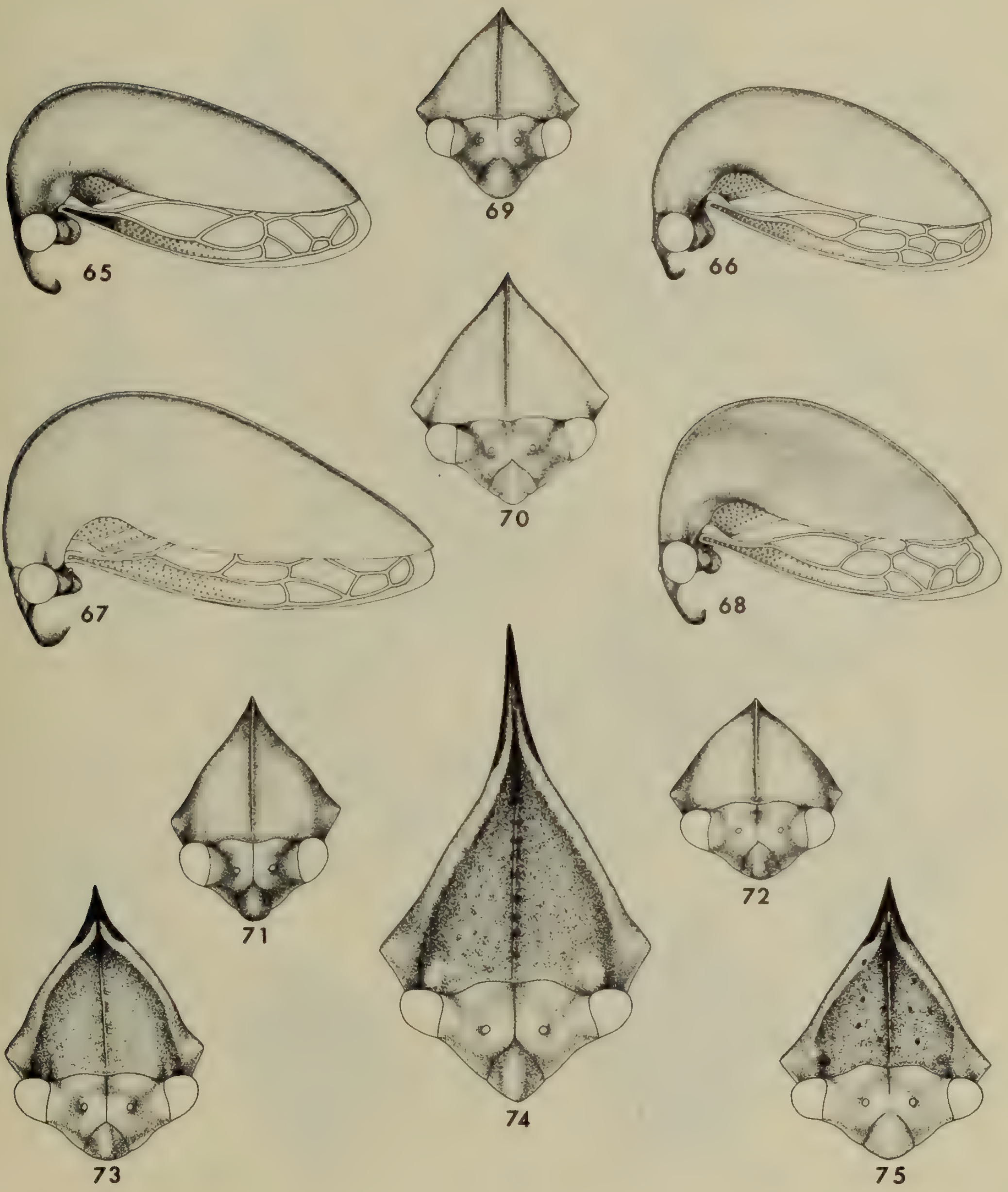
FIGS 59–64. Lateral view of *Amastris* species. 59, *depressa;* 60, *sulphurea;* 61, *discreta;* 62, *simillima;* 63, *gregaria;* 64, *compacta.*



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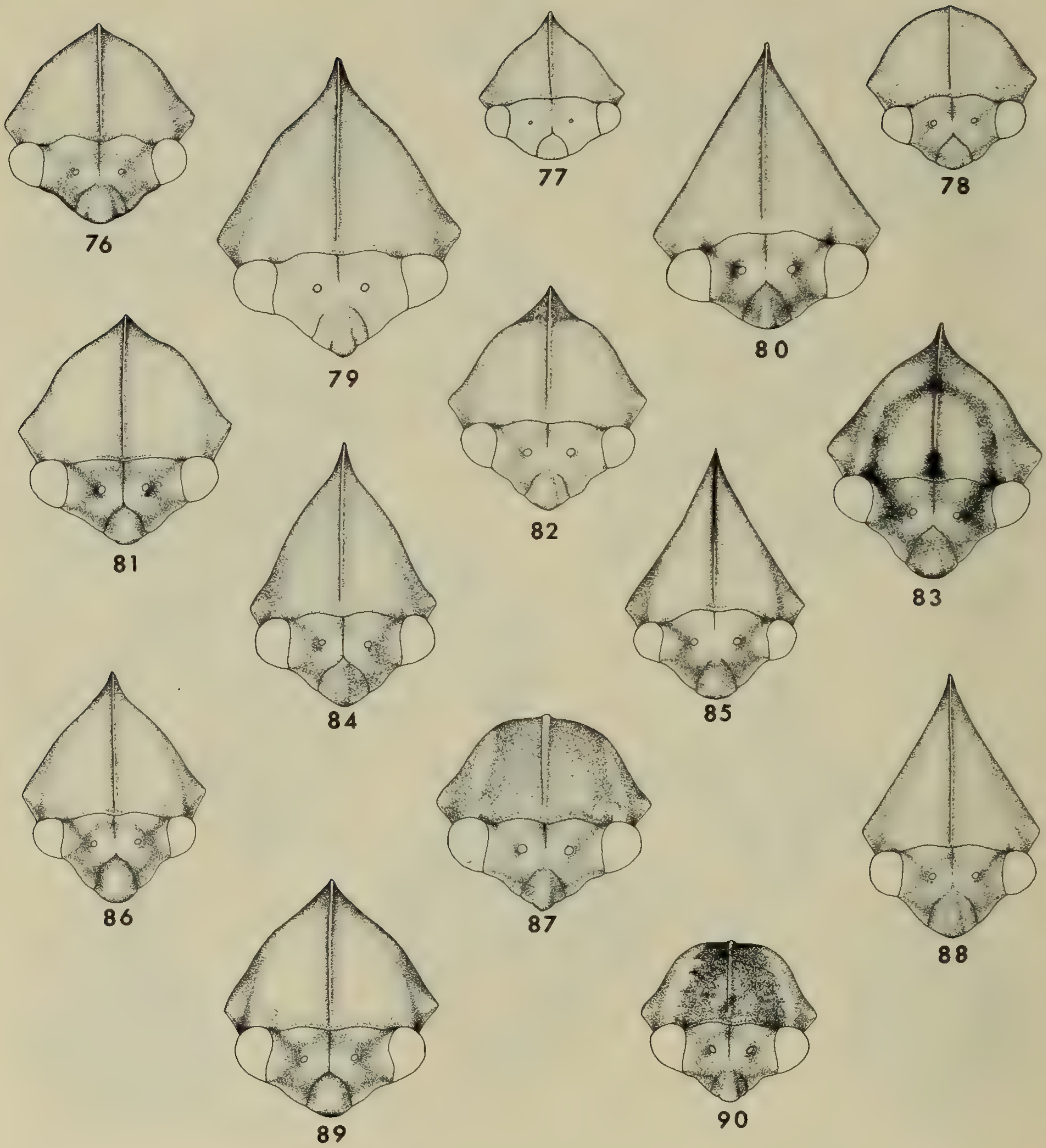
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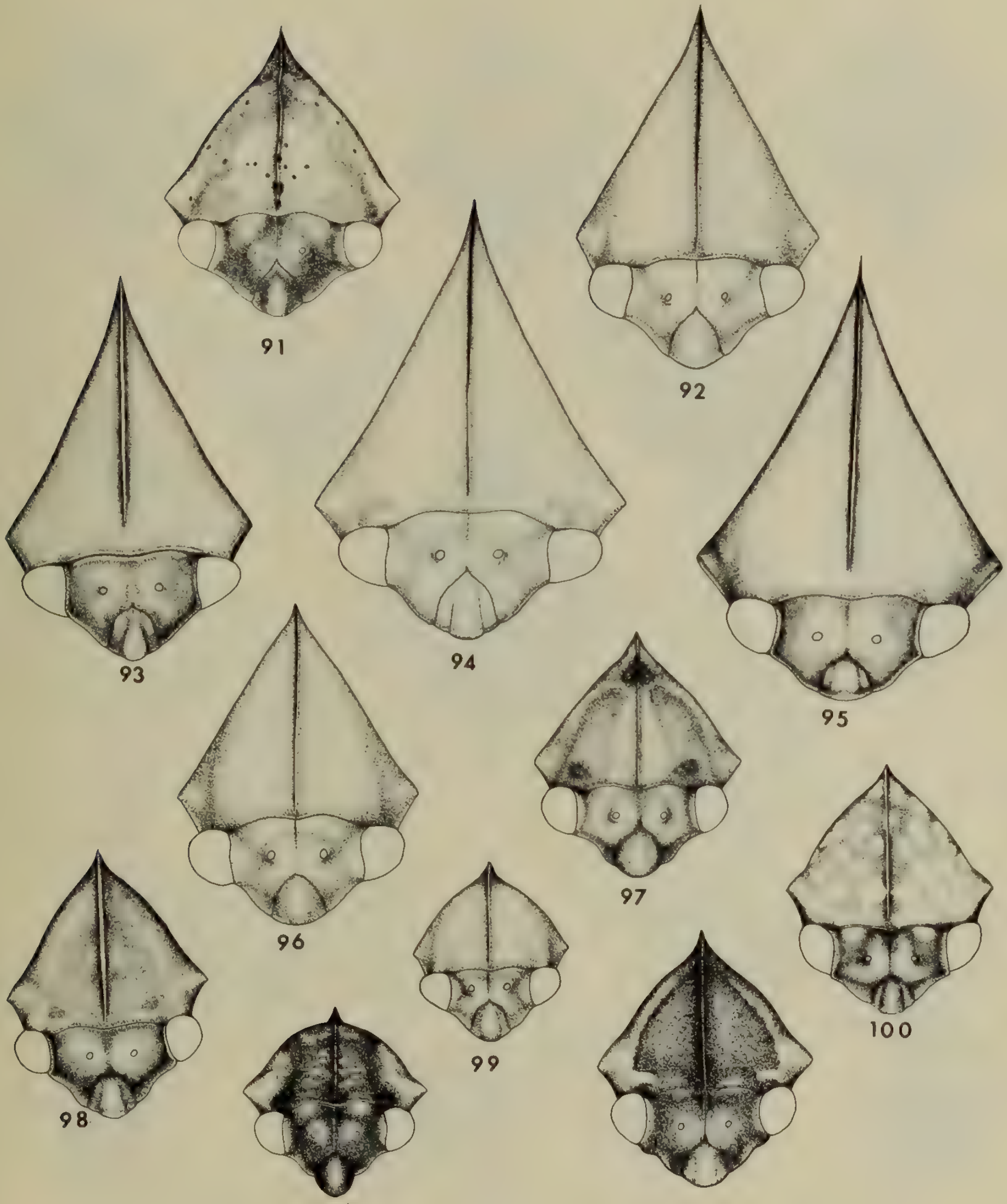
Figs 76–90. Anterior views of *Amastris* species. 76, *fonsecai*; 77, *panamensis*; 78, *froeschneri*; 79, *robusta*; 80, *flavifolia*; 81, *affinis*; 82, *funkhouseri*; 83, *revelata*; 84, *straminea*; 85, *vitallina*; 86, *inornata*; 87, *specialis*; 88, *vicina*; 89, *fallax*; 90, *undulata*.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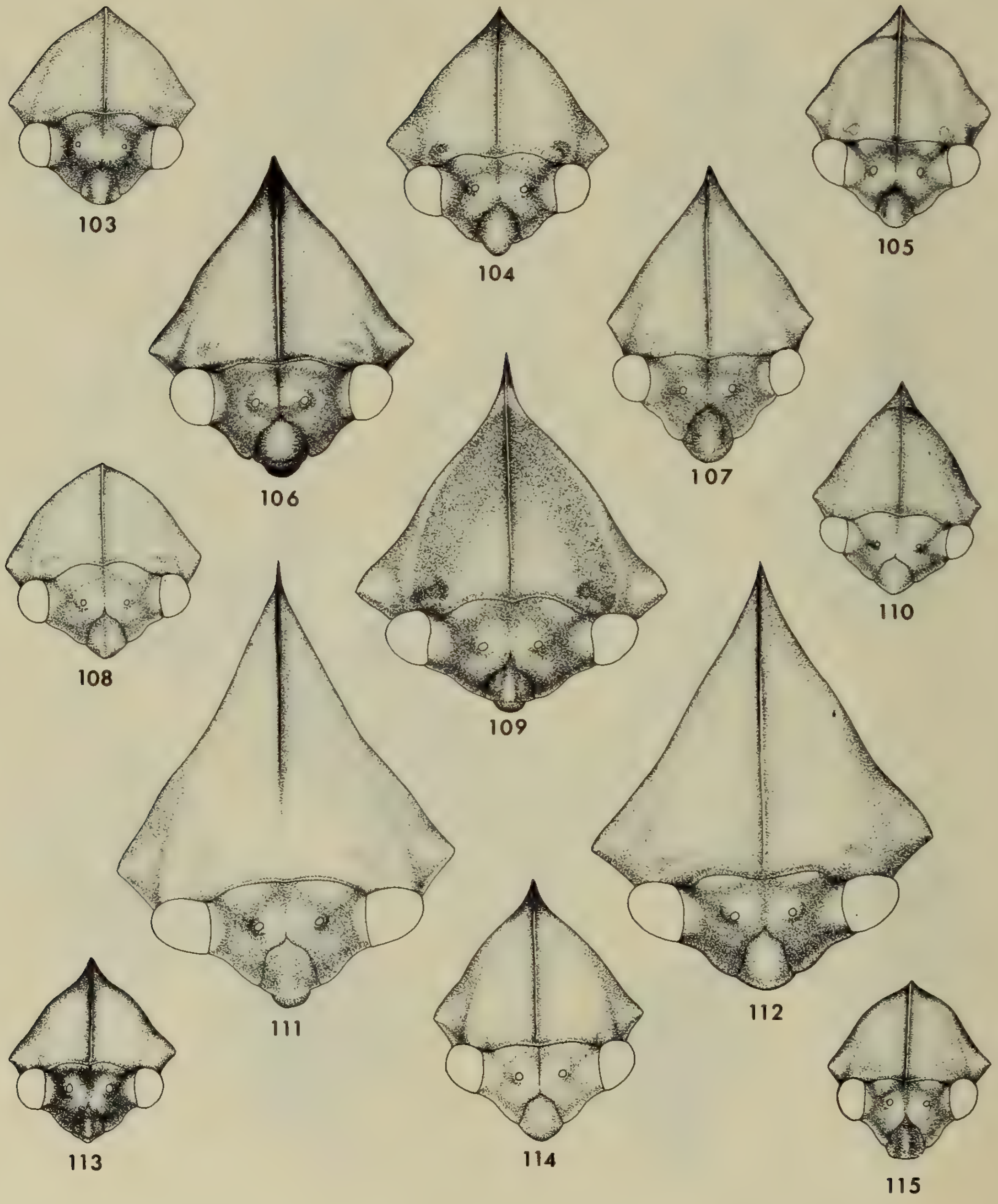
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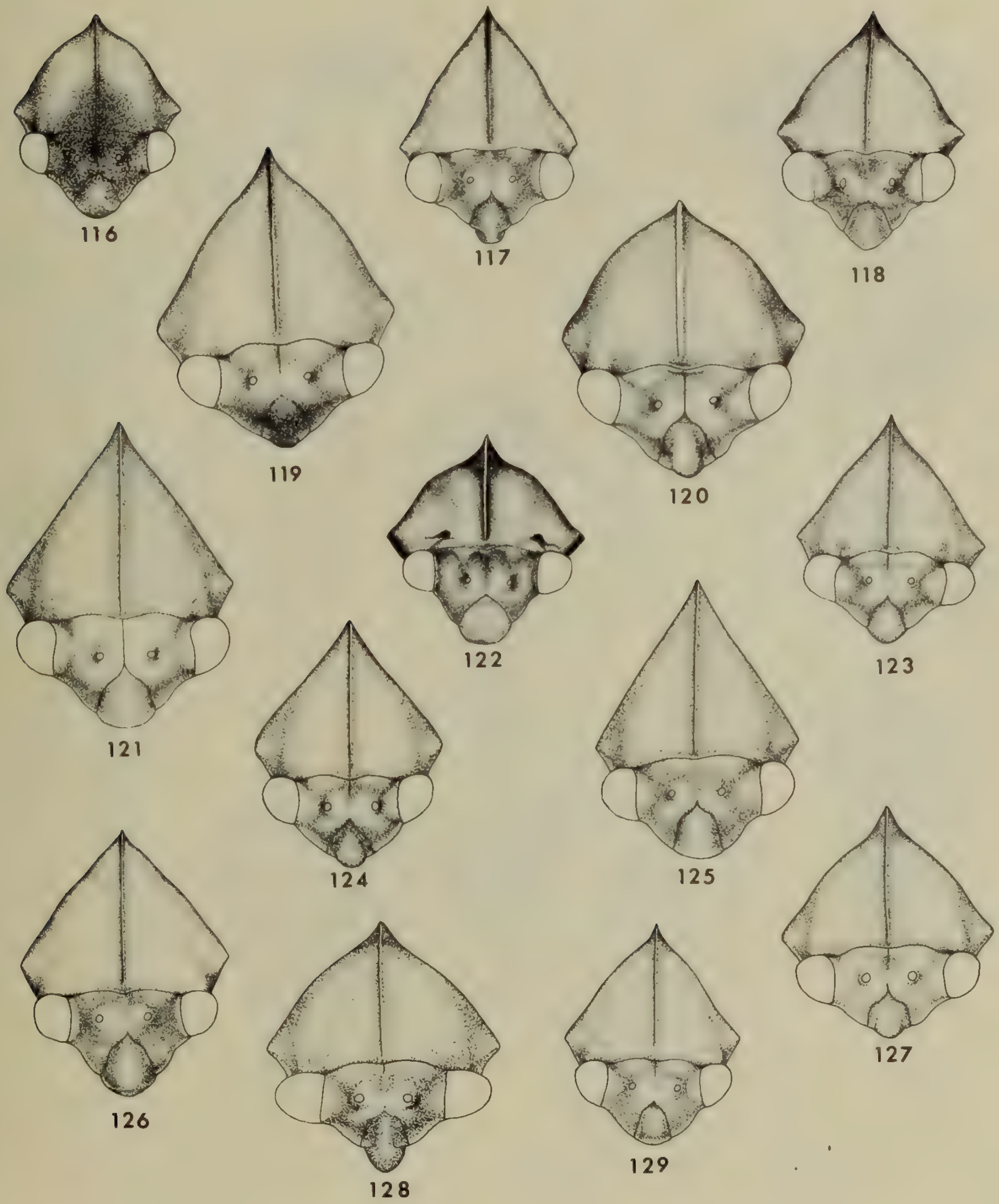
FIGS 103–115. Anterior view of *Amastris* species. 103, *brunneipennis;* 104, *dissimilis;* 105, *sabulosa;* 106, *alapigmentata;* 107, *flava;* 108, *templa;* 109, *pseudoelevata;* 110, *lycioda;* 111, *projecta;* 112, *peruviana;* 113, *exigua;* 114, *inermis;* 115, *reclusa.*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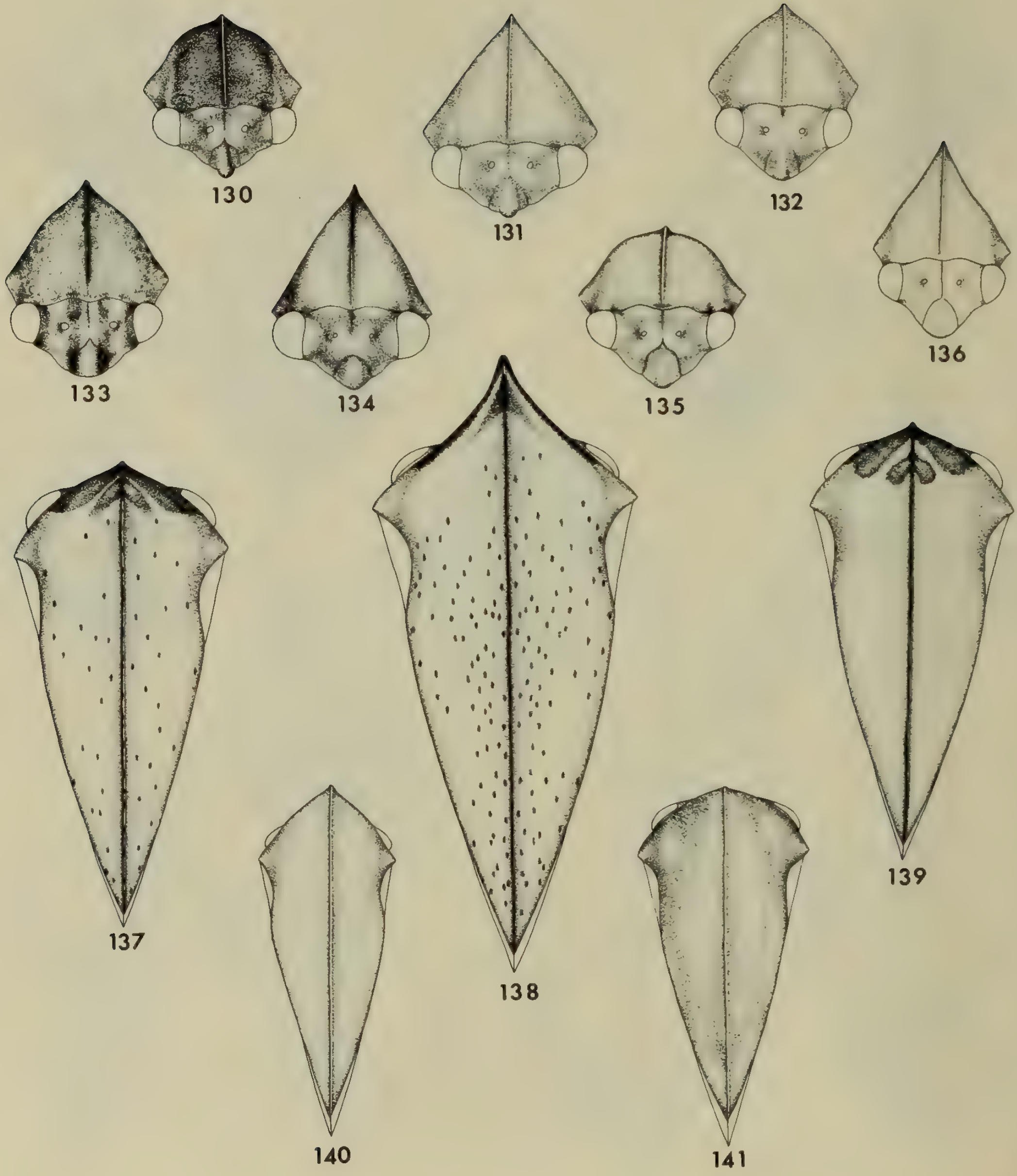
FIGS 116–129. Anterior view of *Amastris* species. 116, *janae;* 117, *knighti;* 118, *depressa;* 119, *interstincta;* 120, *simillima;* 121, *obscura;* 122, *dama;* 123, *evexa;* 124, *discreta;* 125, *compacta;* 126, *gregaria;* 127, *deplumis;* 128, *sulphurea;* 129, *minuta.*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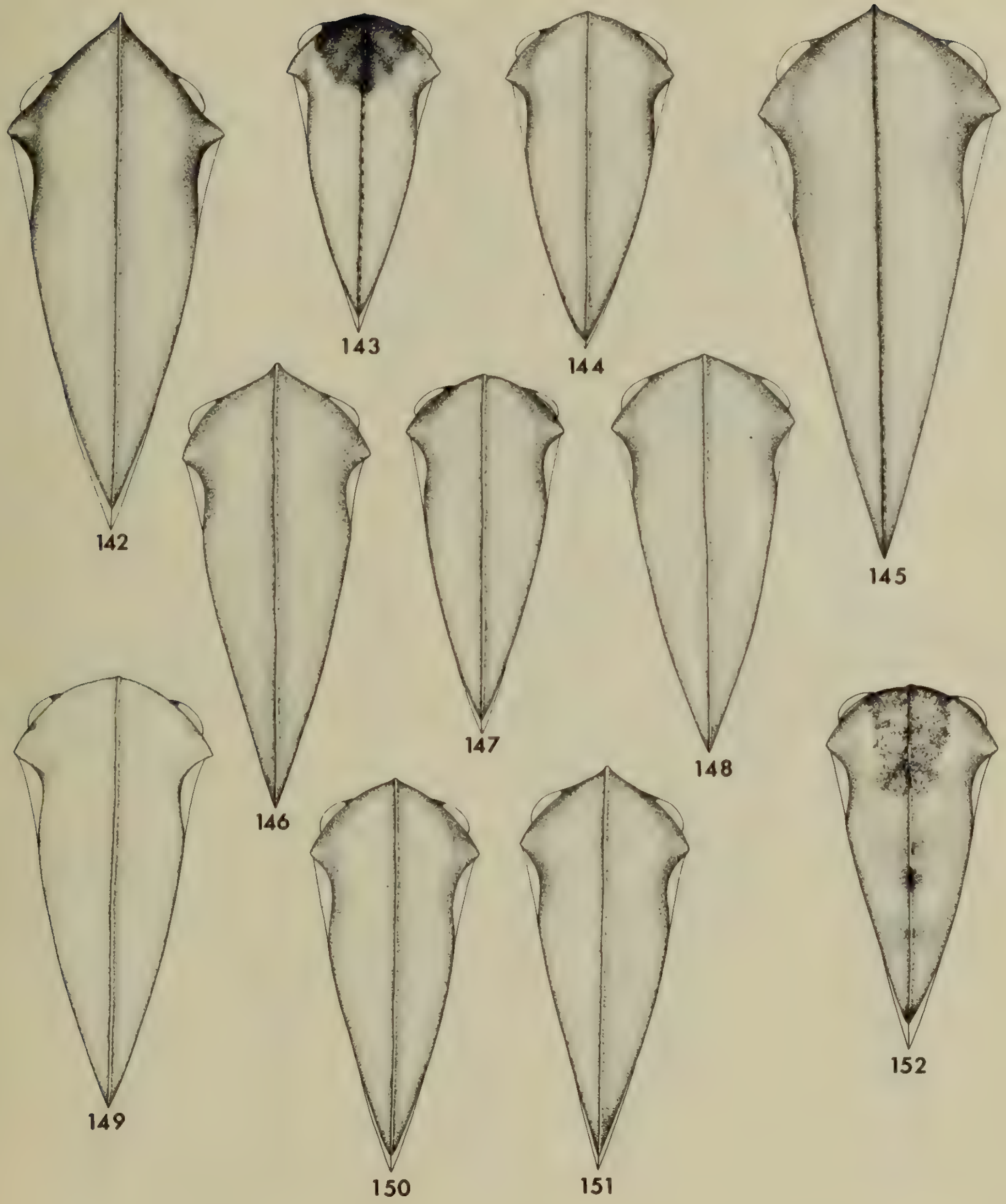
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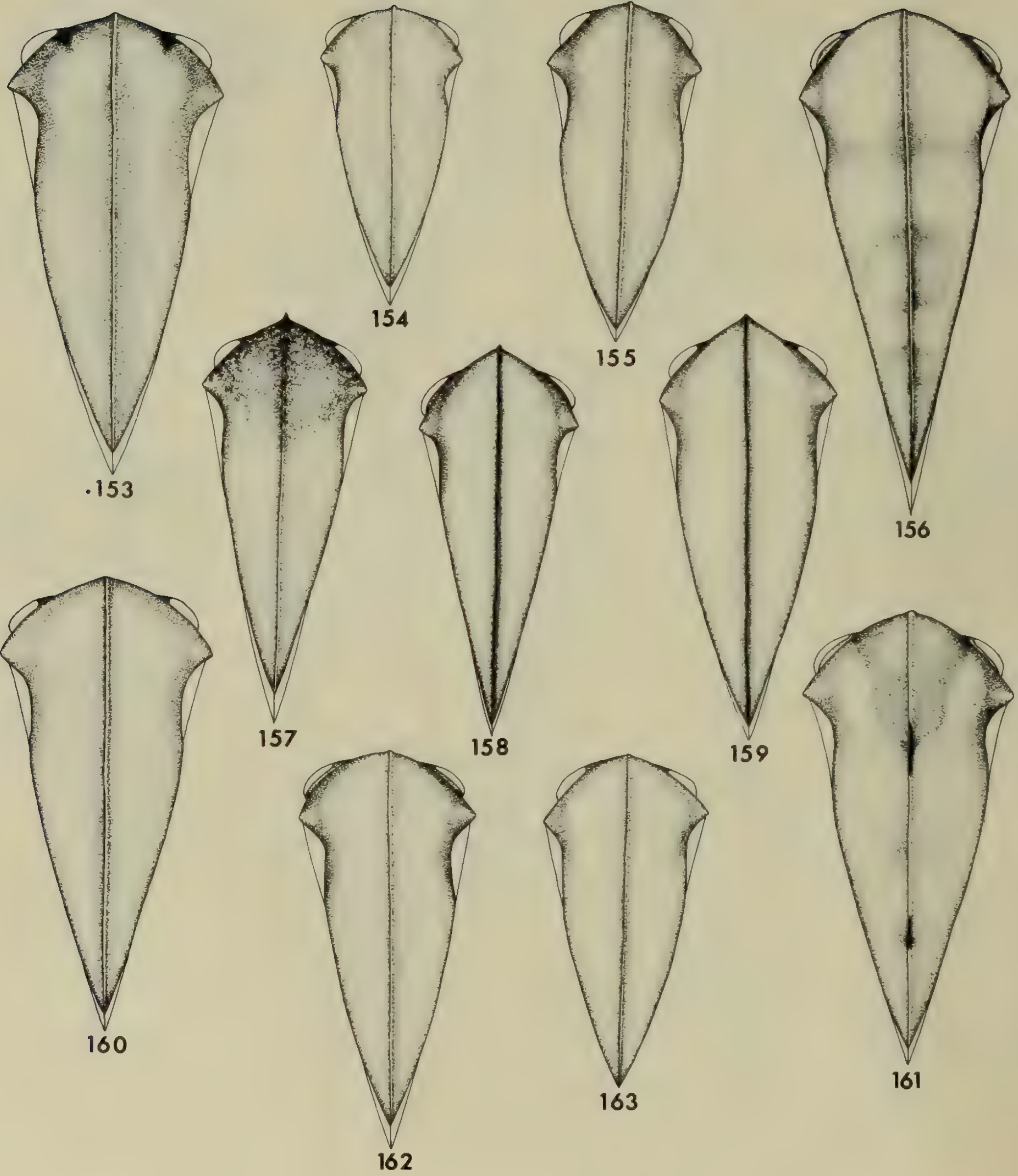
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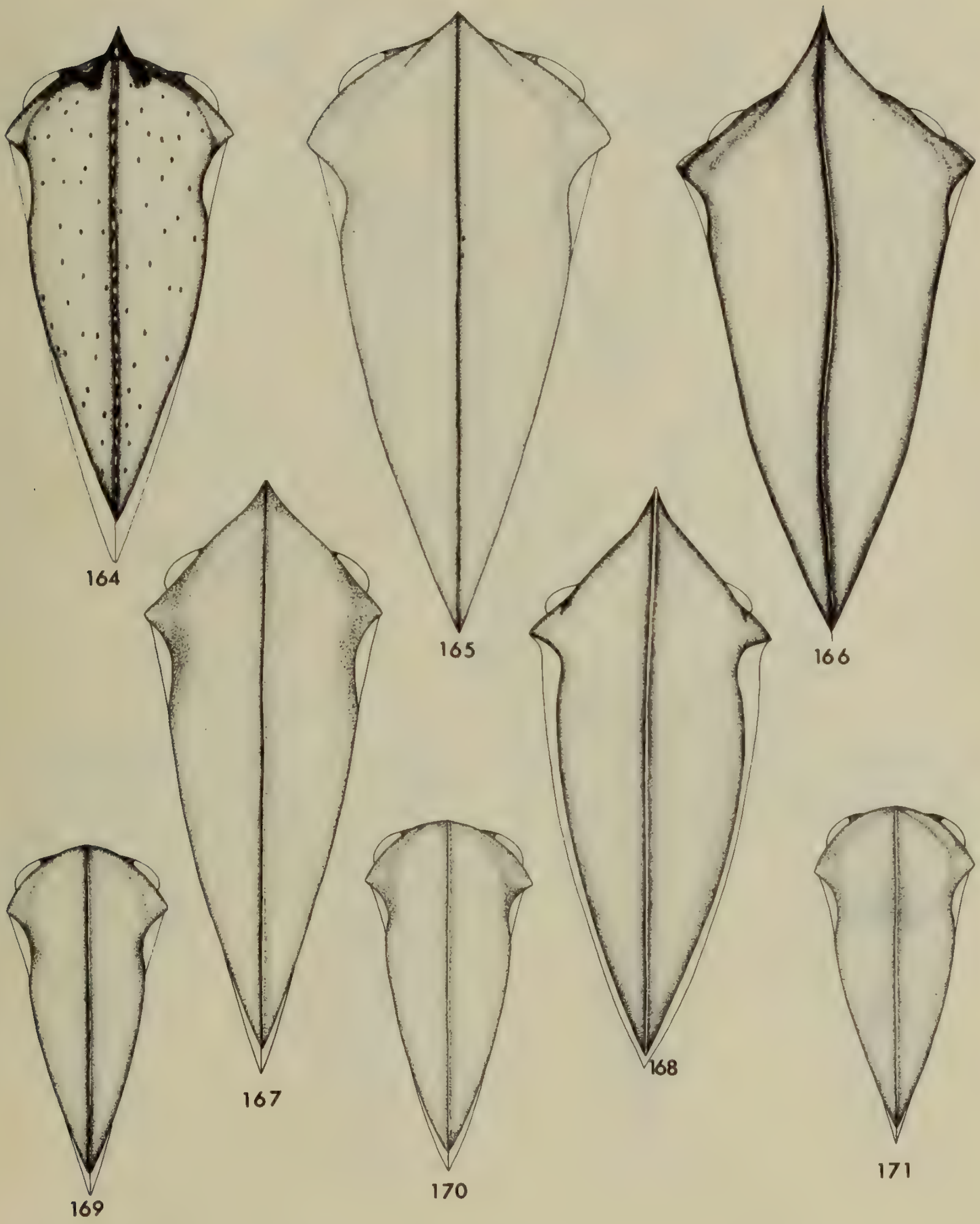
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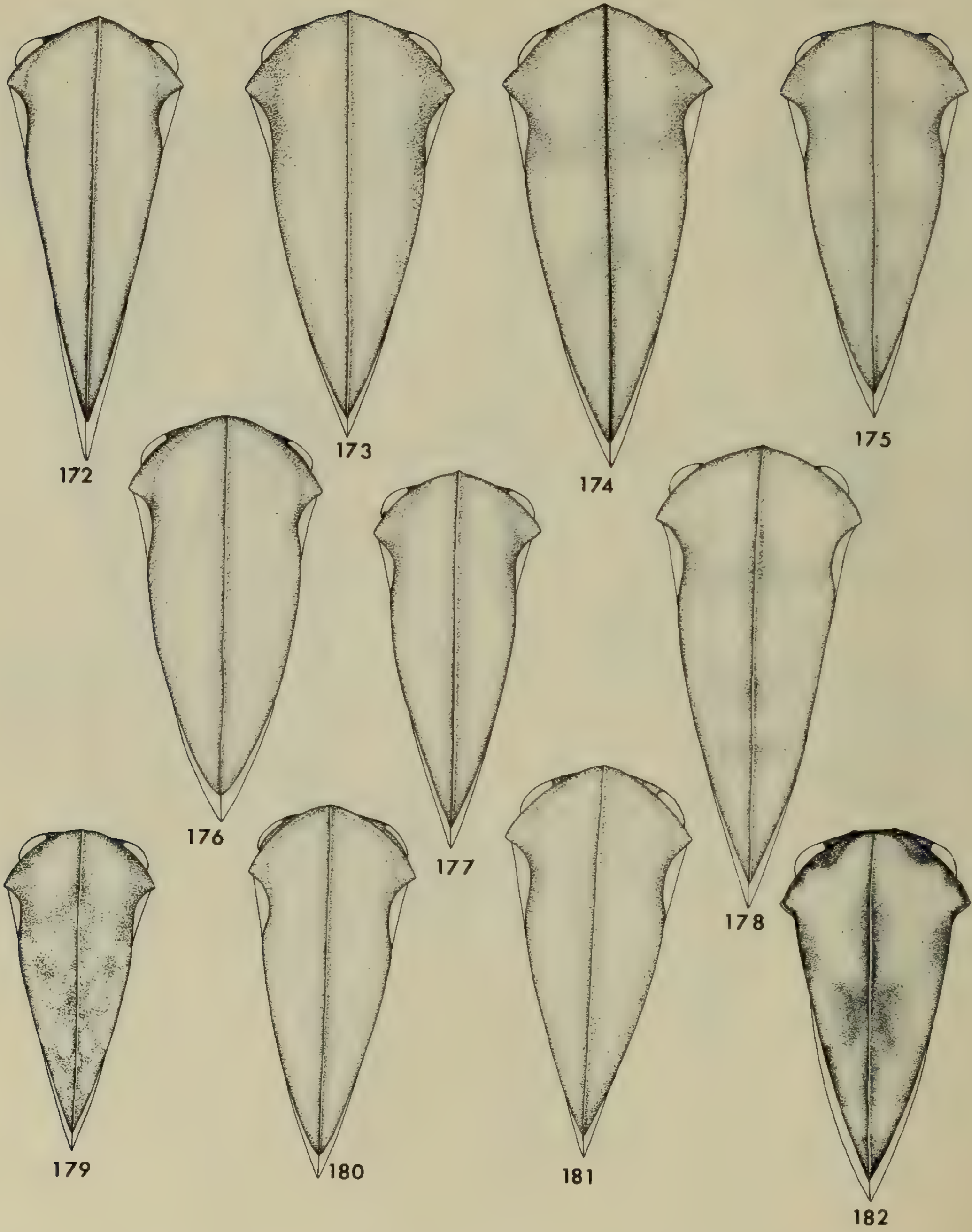
FIGS 164–171. Dorsal view of *Amastris* species. 164, *punctata;* 165, *elevata;* 166, *obtegens;* 167, *concolor;* 168, *vismiae;* 169, *exigua;* 170, *minuta;* 171, *reclusa.*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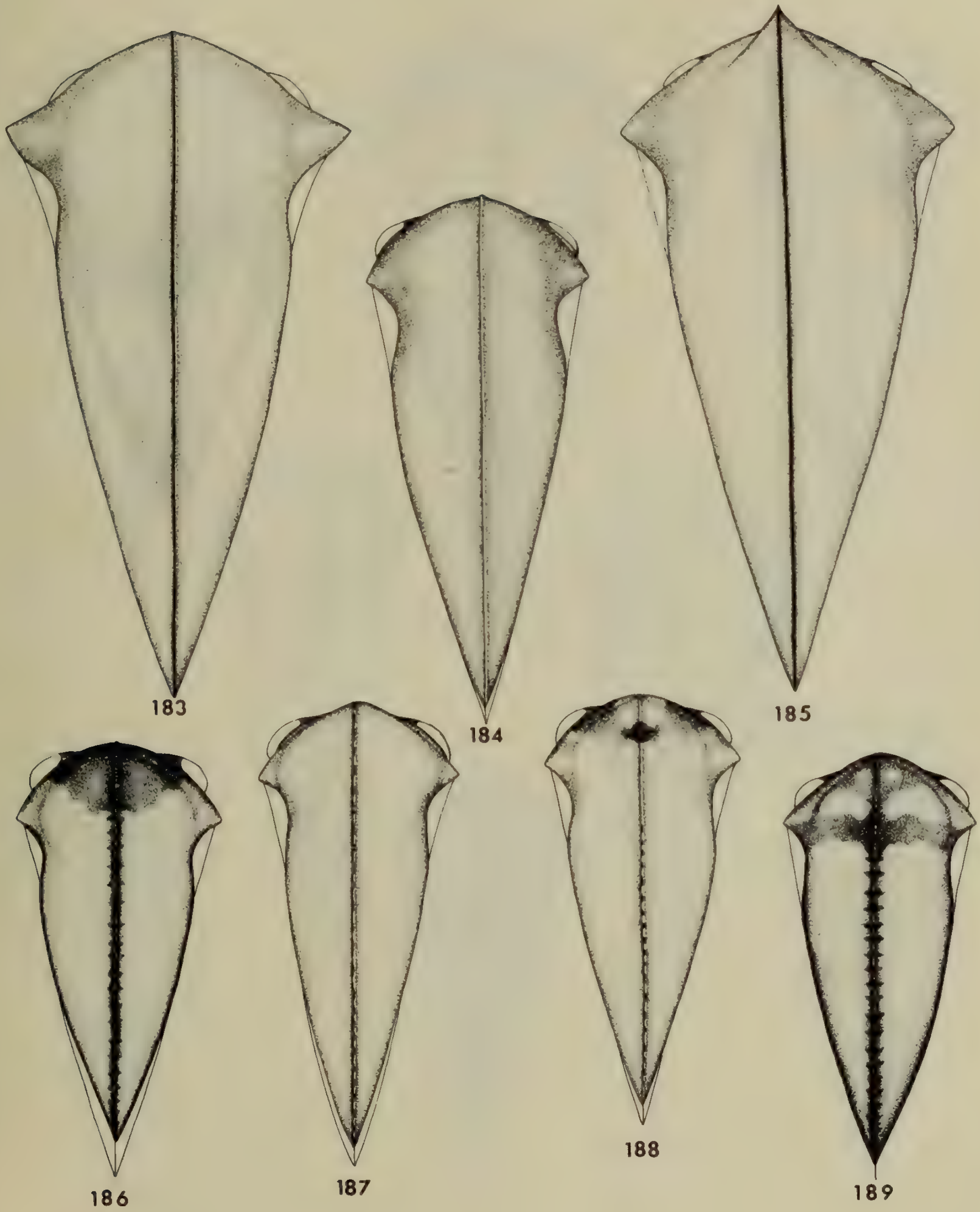
Figs 172–182. Dorsal view of *Amastris* species. 172, *depressa;* 173, *deplumis;* 174, *dissimilis;* 175, *evexa;* 176, *templa;* 177, *janae;* 178, *gregaria;* 179, *viridisparsa;* 180, *lycioda;* 181, *brunneipennis;* 182, *dama.*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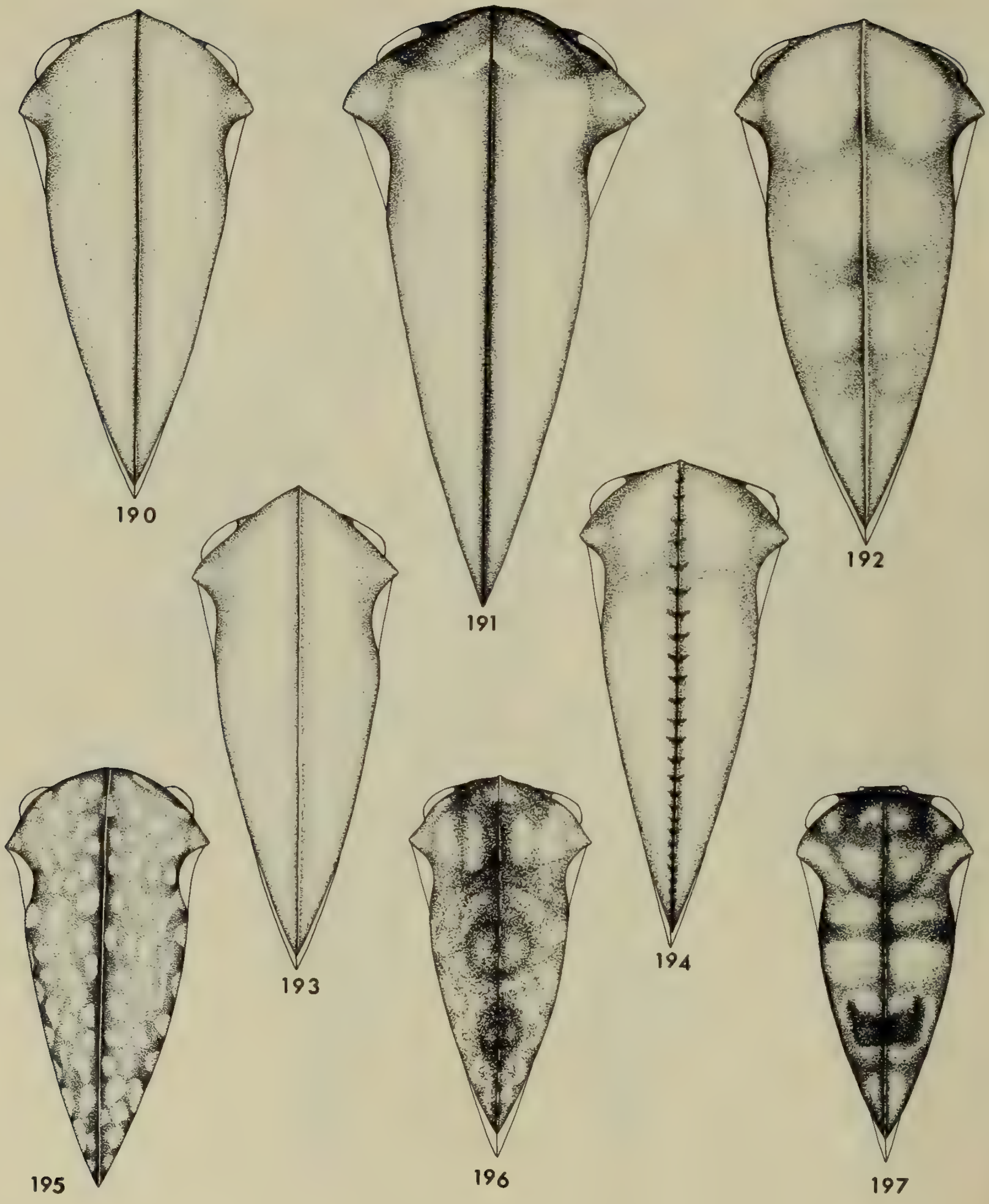
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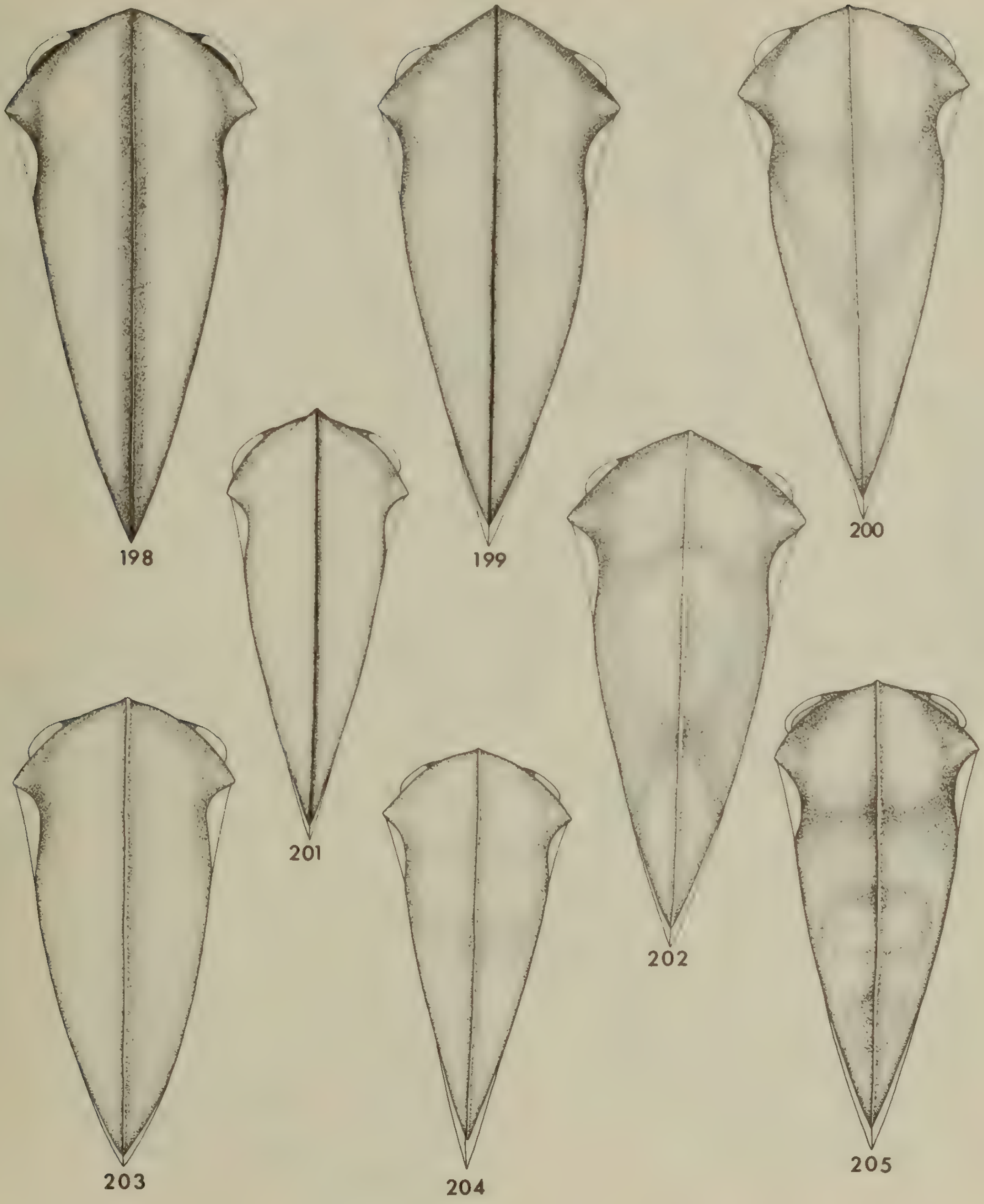
Figs 190–197. Dorsal view of *Amastris* species. 190, *ramosa;* 191, *pseudoelevata;* 192, *simillima;* 193, *compacta;* 194, *inermis;* 195, *guttata;* 196, *sabulosa;* 197, *notata.*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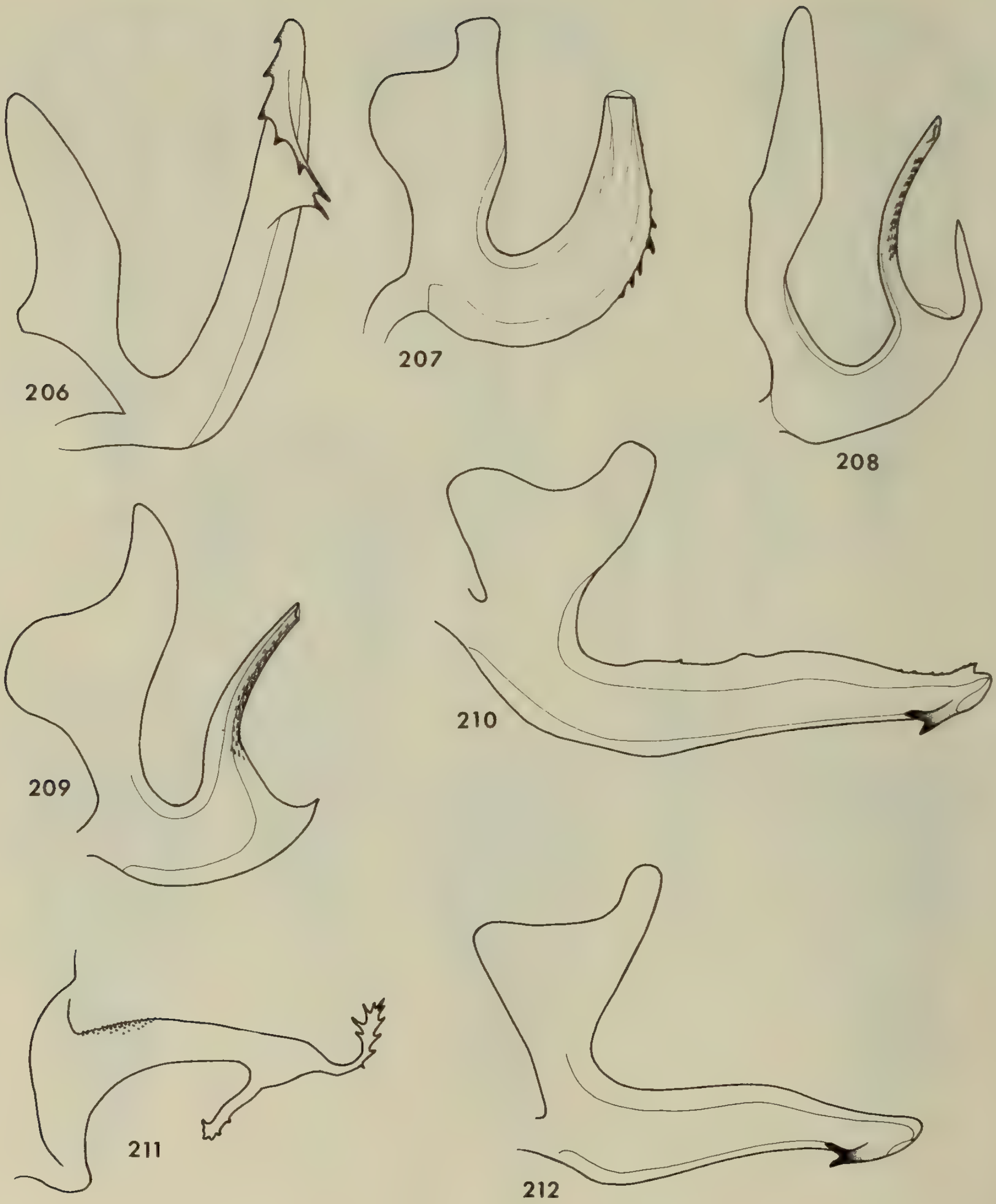
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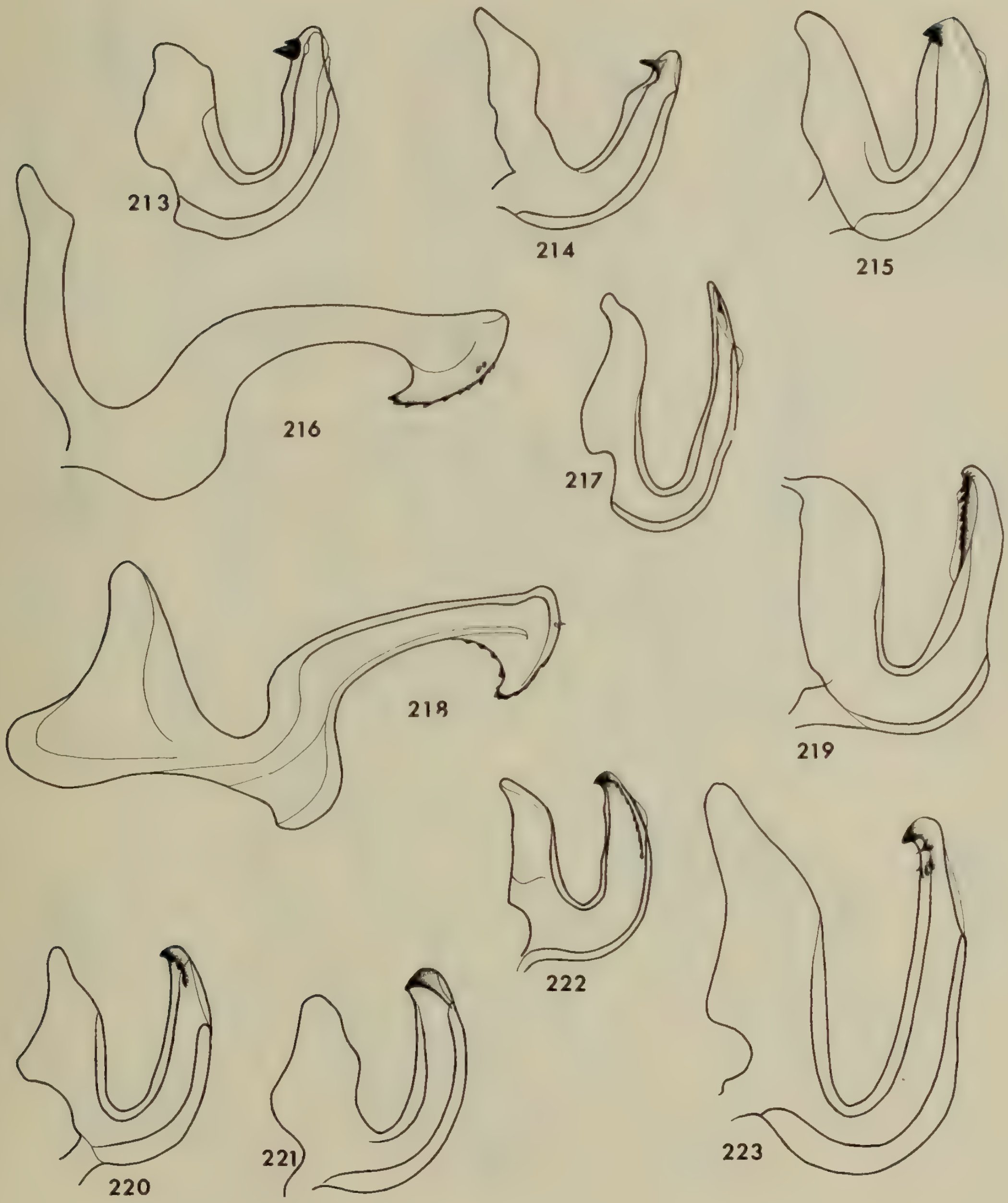
FIGS 206–212. Left lateral view of aedeagus of *Amastris* species. 206, *dissimilis;* 207, *obtegens;* 208, *concolor;* 209, *vitallina;* 210, *ramosa;* 211, *dama;* 212, *interstincta.*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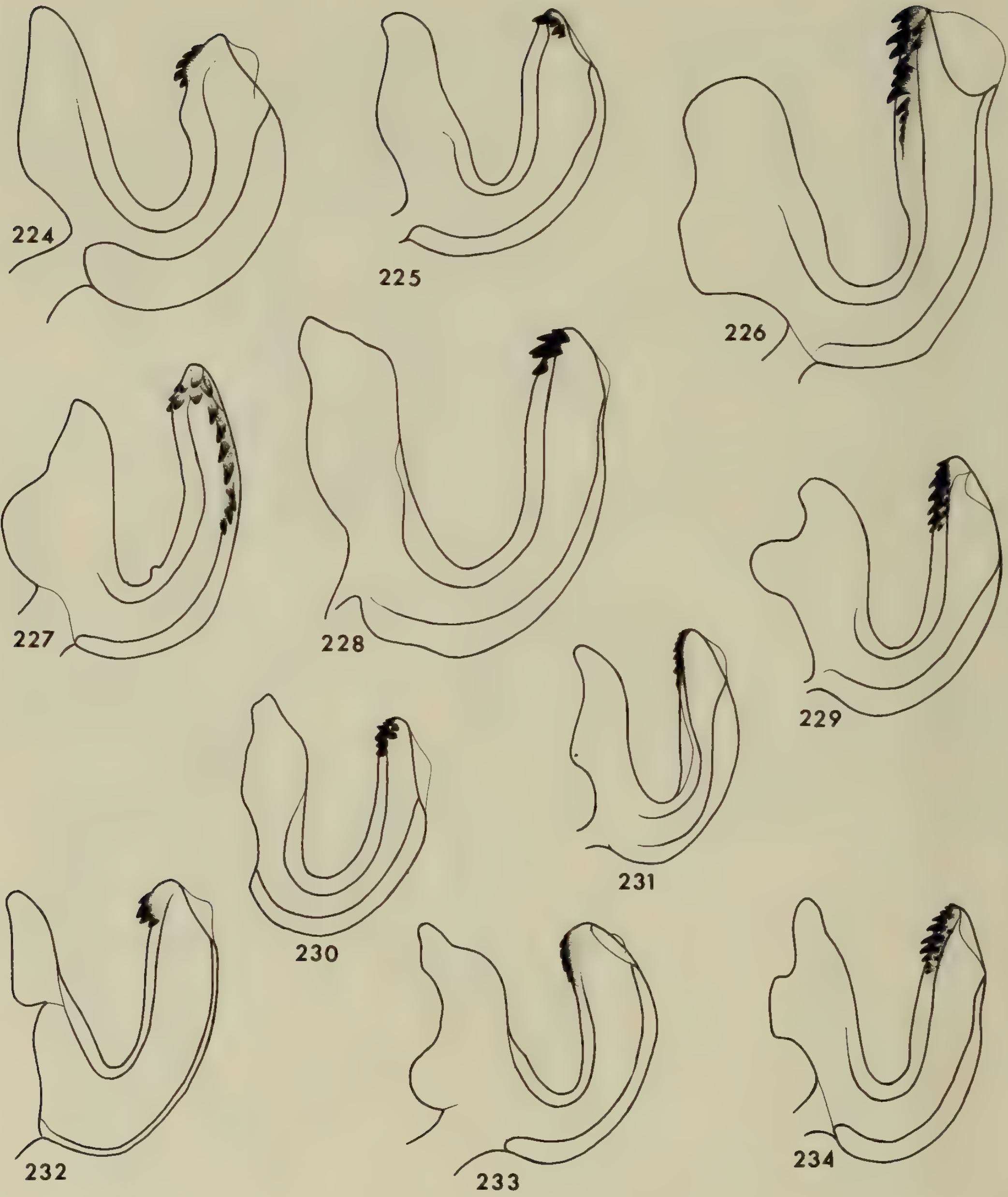
Figs 213–223. Left lateral view of aedeagus of *Amastris* species. 213, *knighti;* 214, *unica;* 215, *deplumis;* 216, *flavifolia;* 217, *minuta;* 218, *vismiae;* 219, *fasciata;* 220, *brunneipennis;* 221, *inclinata;* 222, *exigua;* 223, *lycioda.*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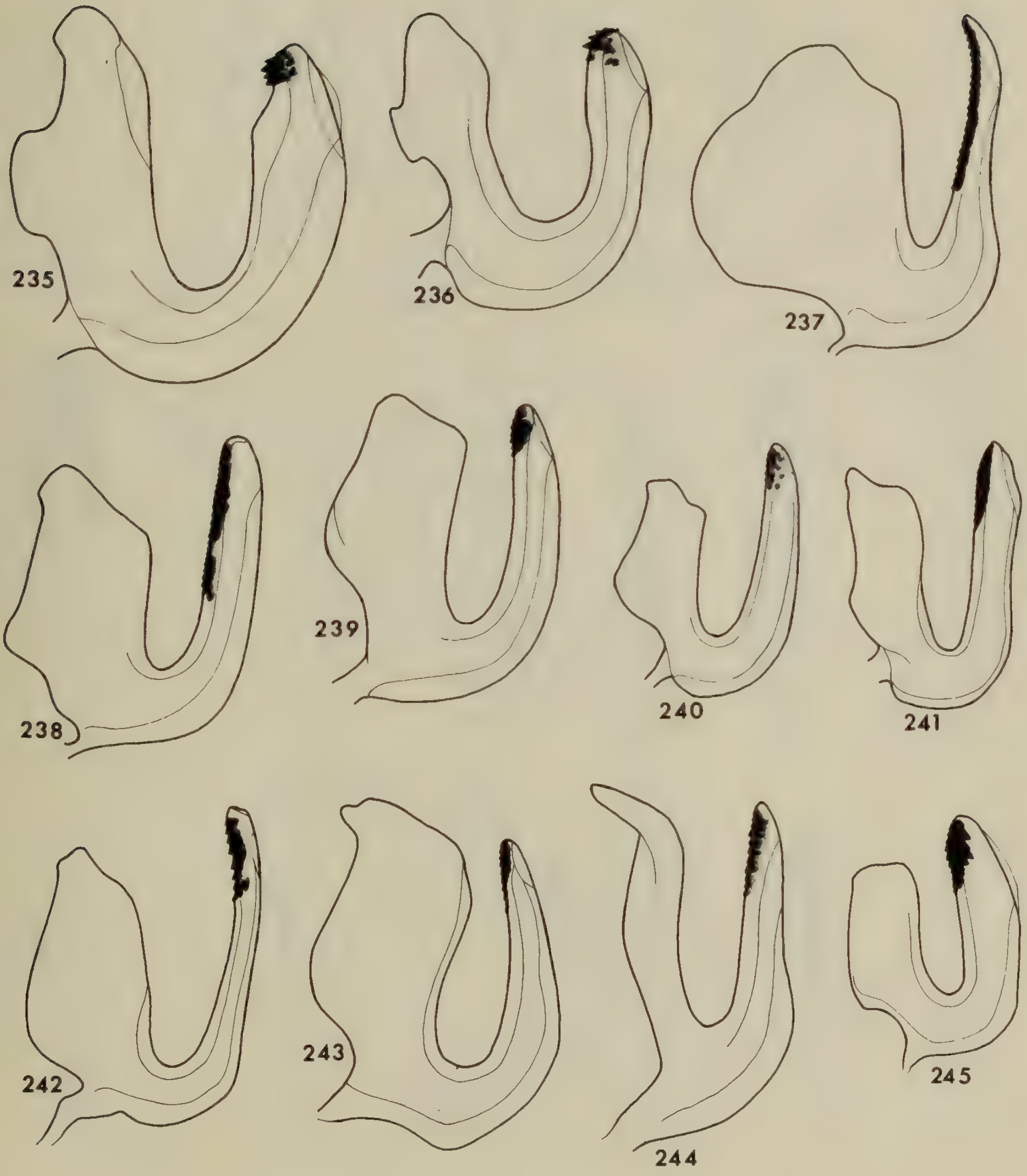
FIGS 224–234. Left lateral view of aedeagus of *Amastris* species. 224, *exaltata;* 225, *subangulata;* 226, *robusta;* 227, *fonsecai;* 228, *alapigmentata;* 229, *vicina;* 230, *triviale;* 231, *froeschneri;* 232, *punctata;* 233, *angulata;* 234, *finitima.*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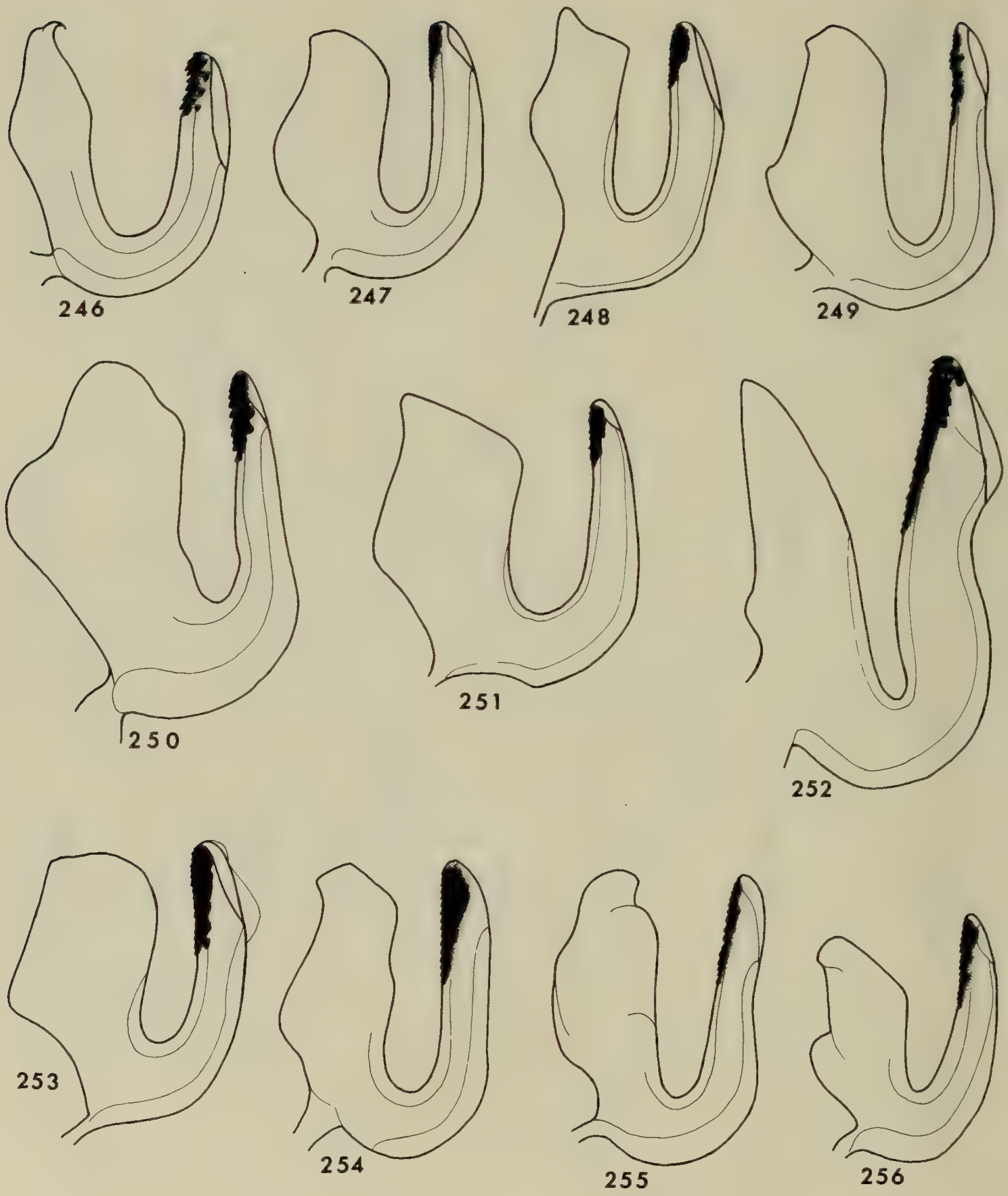
FIGS 235–245. Left lateral view of aedeagus of *Amastris* species. 235, *pseudoelevata;* 236, *inconspicua;* 237, *obscura;* 238, *singularis;* 239, *undulata;* 240, *viridisparsa;* 241, *reclusa;* 242, *flava;* 243, *evexa;* 244, *affinis;* 245, *guttata.*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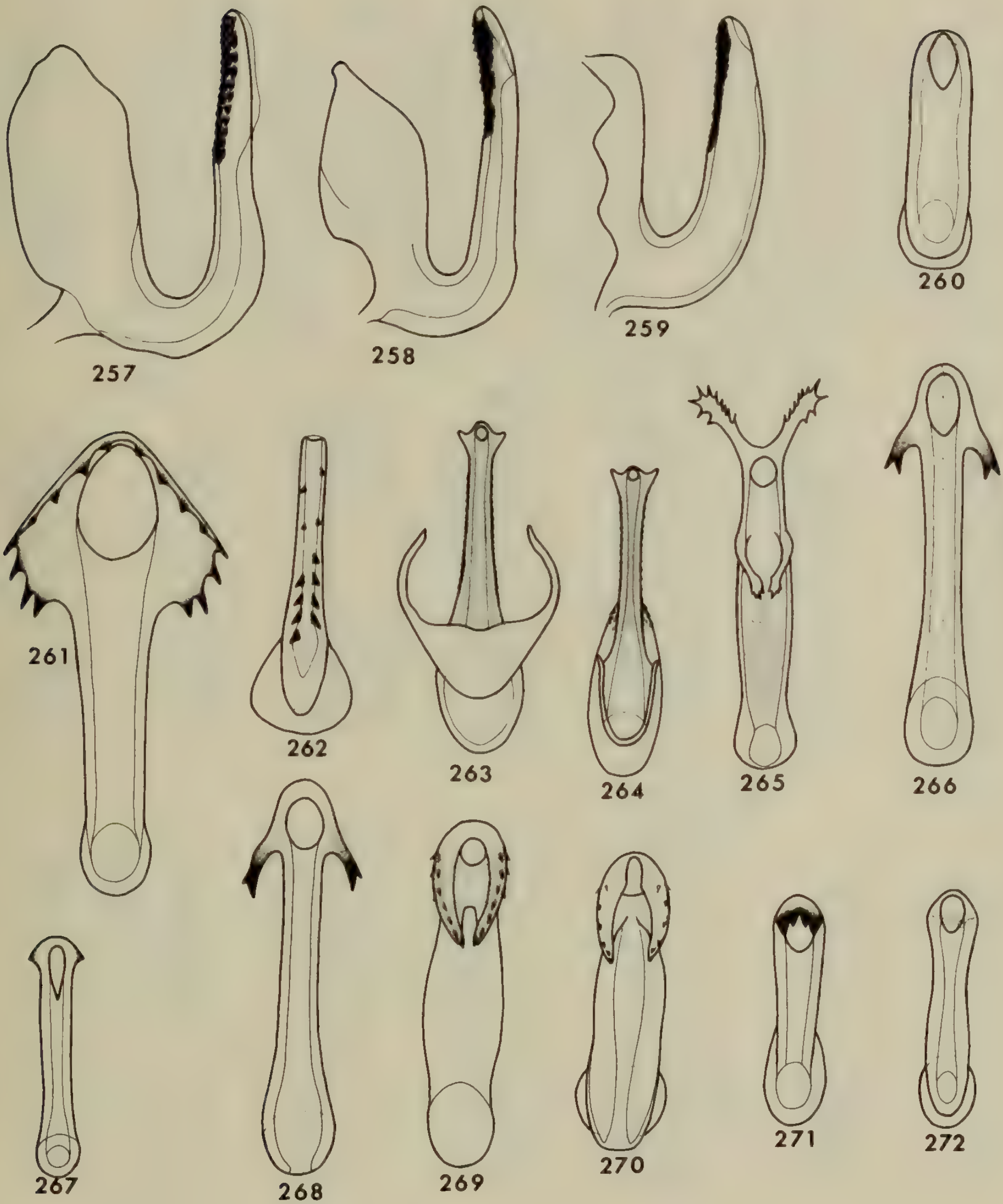
FIGS 246–256. Left lateral view of aedeagus of *Amastris* species. 246, *conspicua;* 247, *pseudomaculata;* 248, *notata;* 249, *gregaria;* 250, *specialis;* 251, *melina;* 252, *templa;* 253, *funkhouseri;* 254, *inornata;* 255, *maculata;* 256, *janae.*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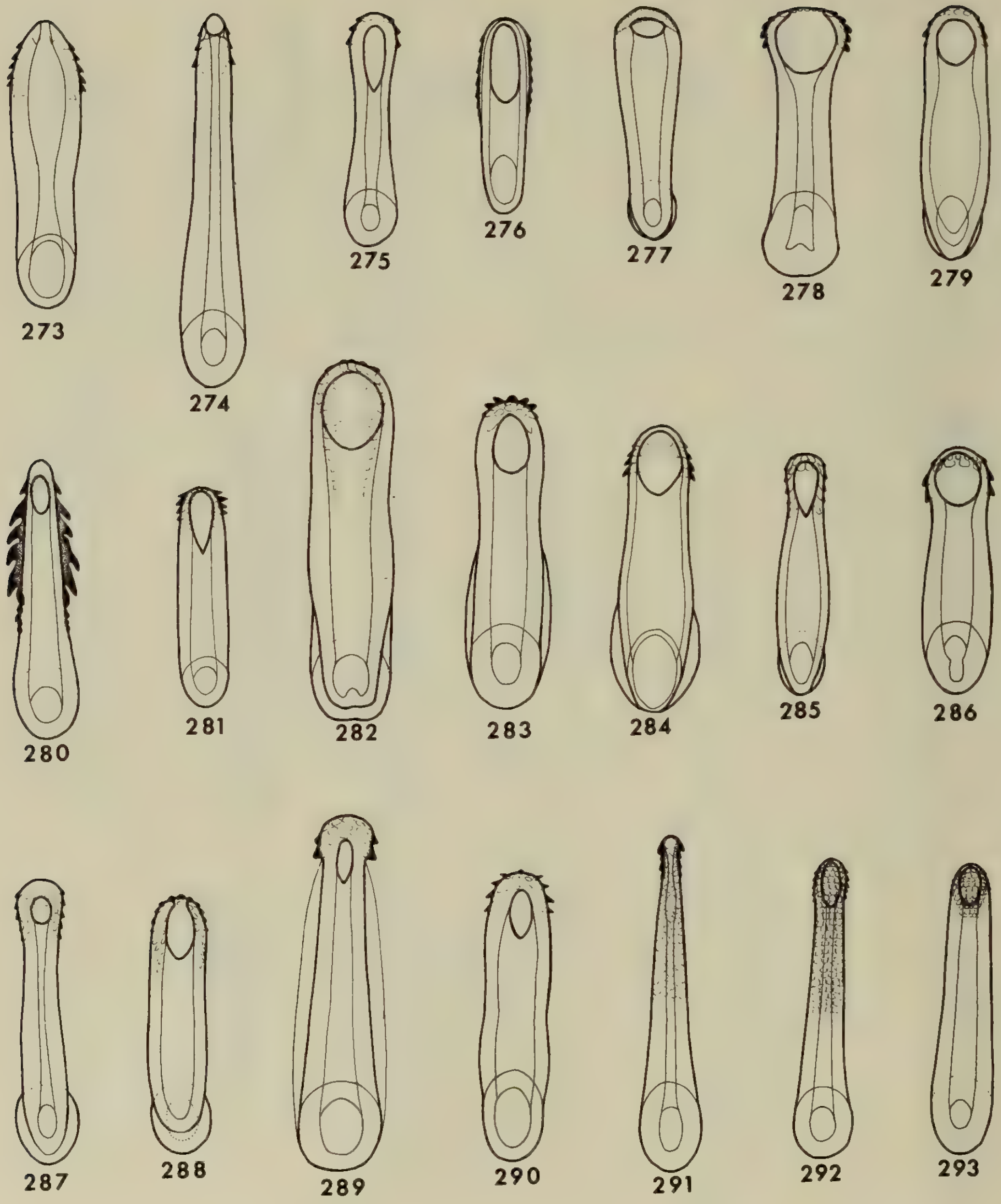
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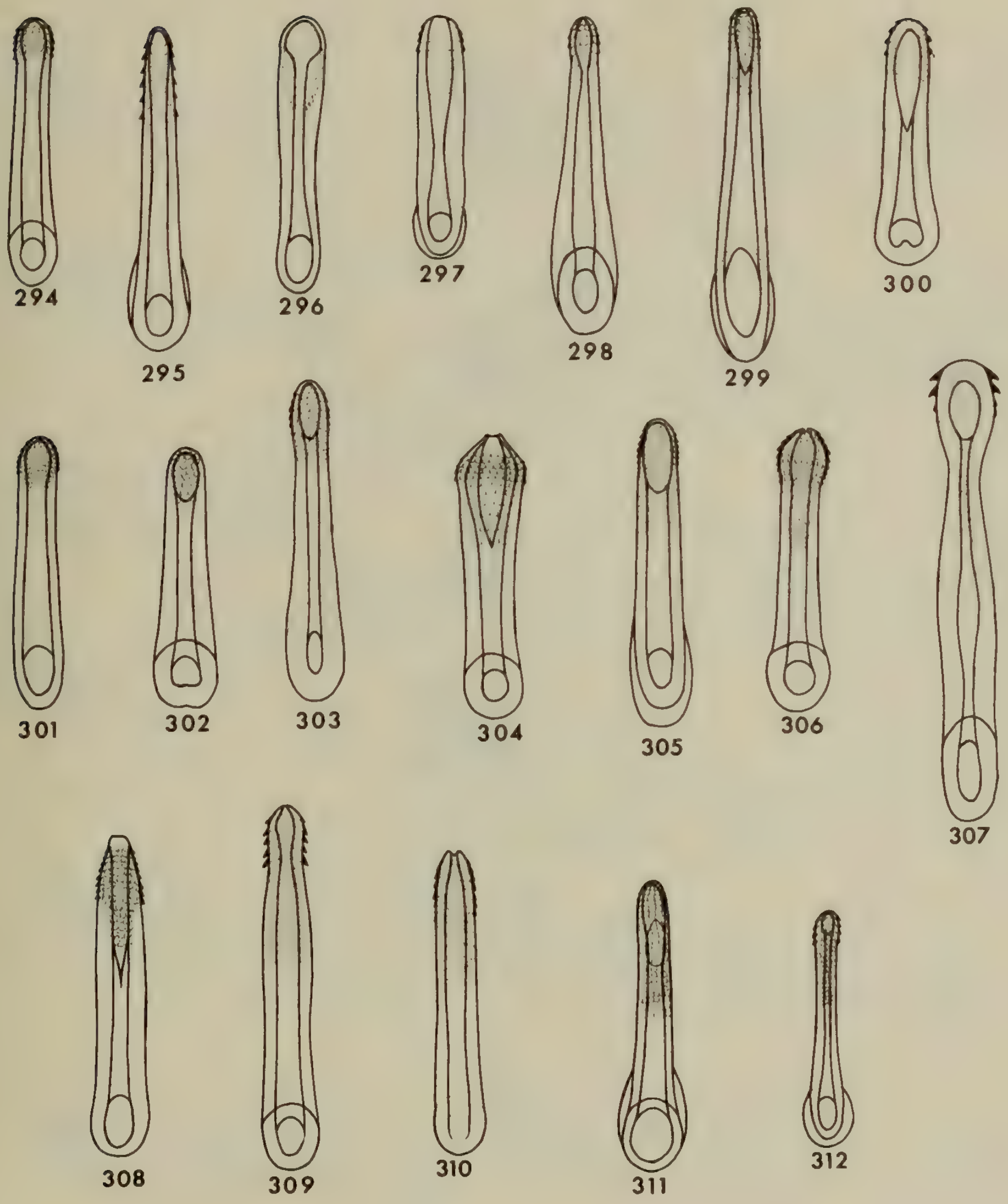
Figs 273–293. Posterior view of aedeagus of *Amastris* species. 273, *fasciata;* 274, *lycioda;* 275, *brunneipennis;* 276, *exigua;* 277, *inclinata;* 278, *exaltata;* 279, *subangulata;* 280, *fonsecai;* 281, *triviale;* 282, *robusta;* 283, *alapigmentata;* 284, *punctata;* 285, *froeschneri;* 286, *angulata;* 287, *vicina;* 288, *finitima;* 289, *pseudoelevata;* 290, *inconspicua;* 291, *obscura;* 292, *singularis;* 293, *undulata.*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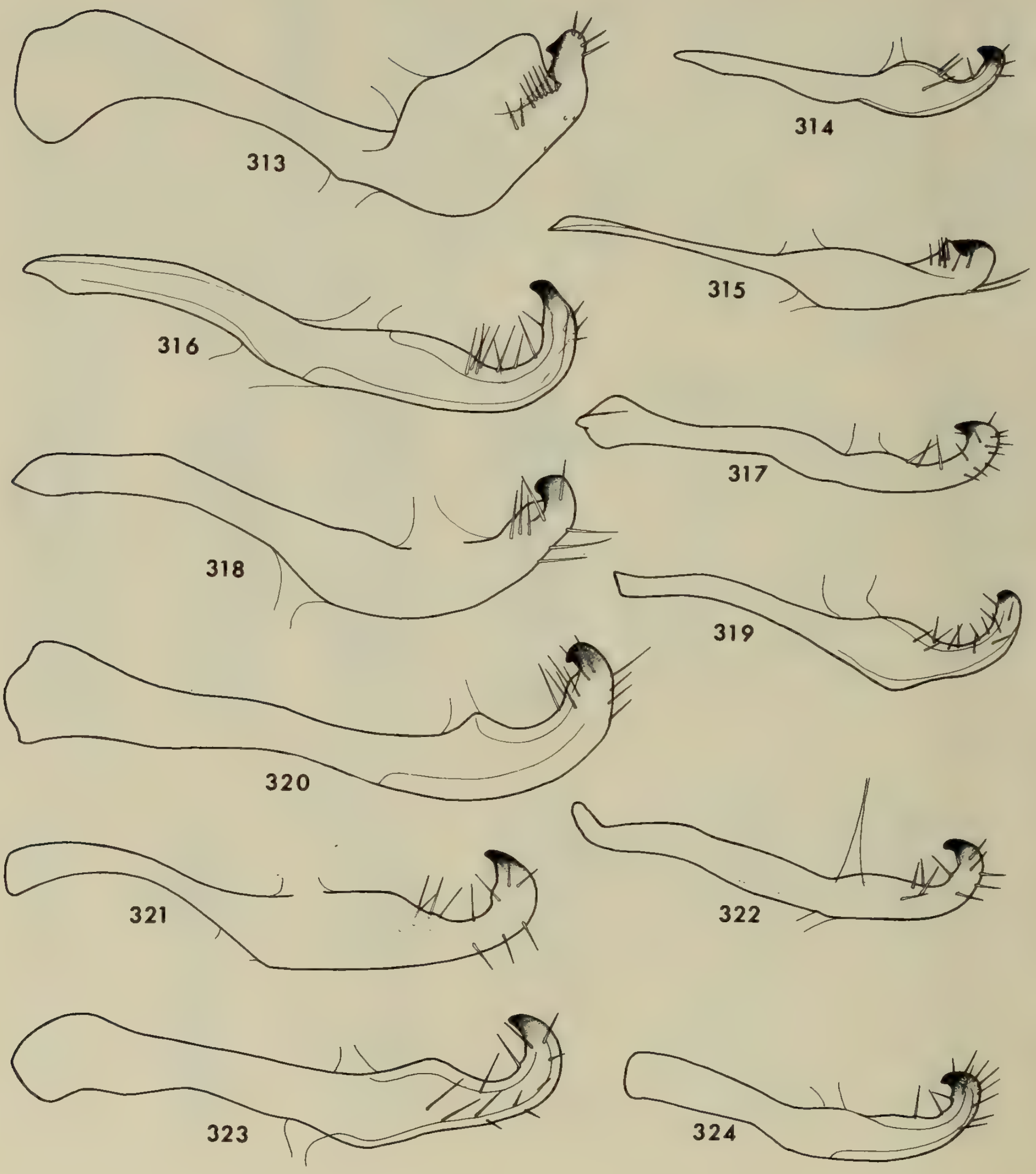
FIGS 294–312. Posterior view of aedeagus of *Amastris* species. 294, *viridisparsa;* 295, *flava;* 296, *reclusa;* 297, *guttata;* 298, *evexa;* 299, *affinis;* 300, *conspicua;* 301, *nottata;* 302, *pseudomaculata;* 303, *specialis;* 304, *gregaria;* 305, *funkhouseri;* 306, *inornata;* 307, *templa;* 308, *maculata;* 309, *inermis;* 310, *sakakibarai;* 311, *depressa;* 312, *janae.*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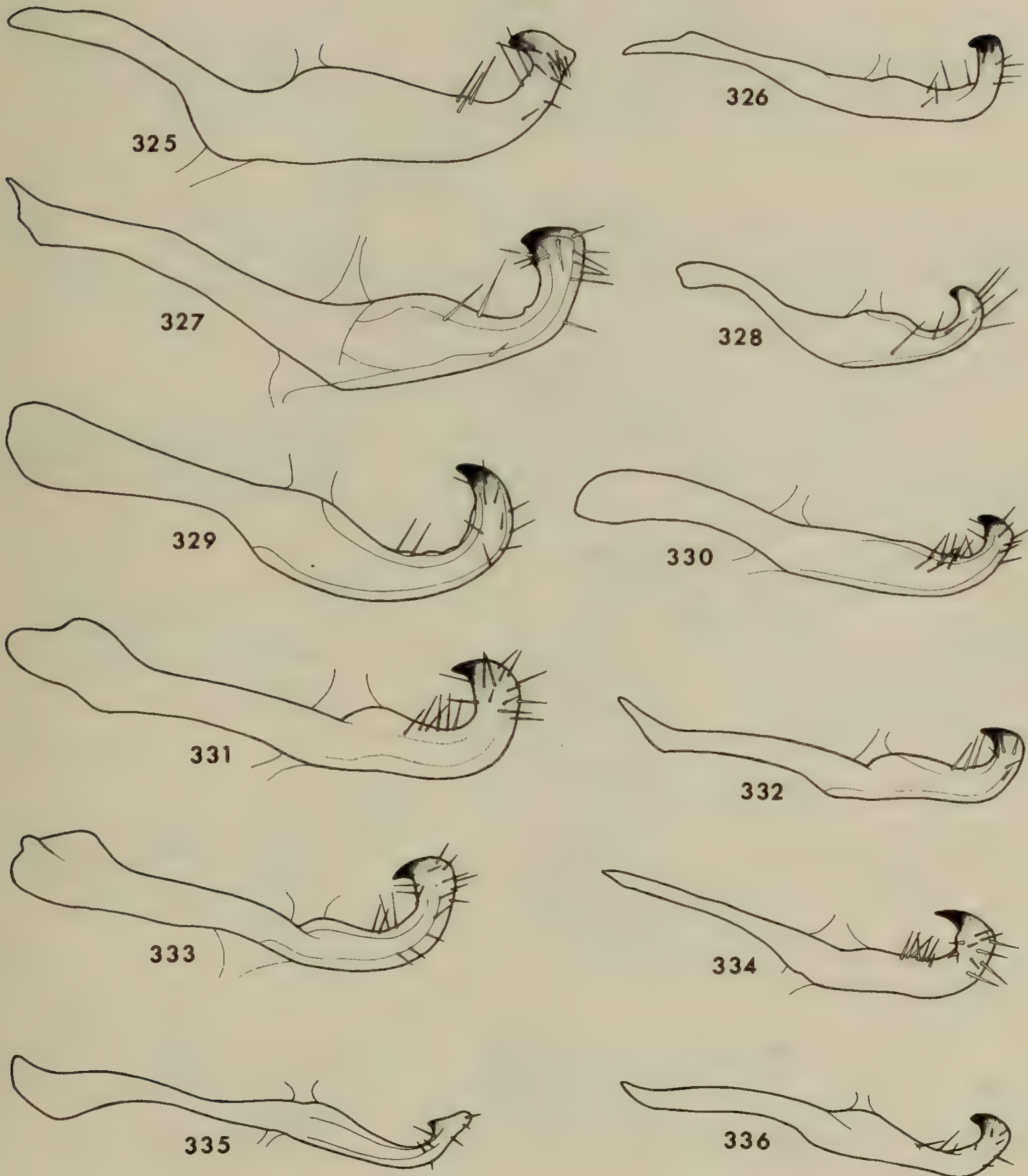
FIGS 313–324. Left lateral view of paramere of *Amastris* species. 313, *dissimilis;* 314, *exigua;* 315, *dama;* 316, *obtegens;* 317, *deplumis;* 318, *concolor;* 319, *fasciata;* 320, *vitallina;* 321, *ramosa;* 322, *knighti;* 323, *interstincta;* 324, *brunneipennis.*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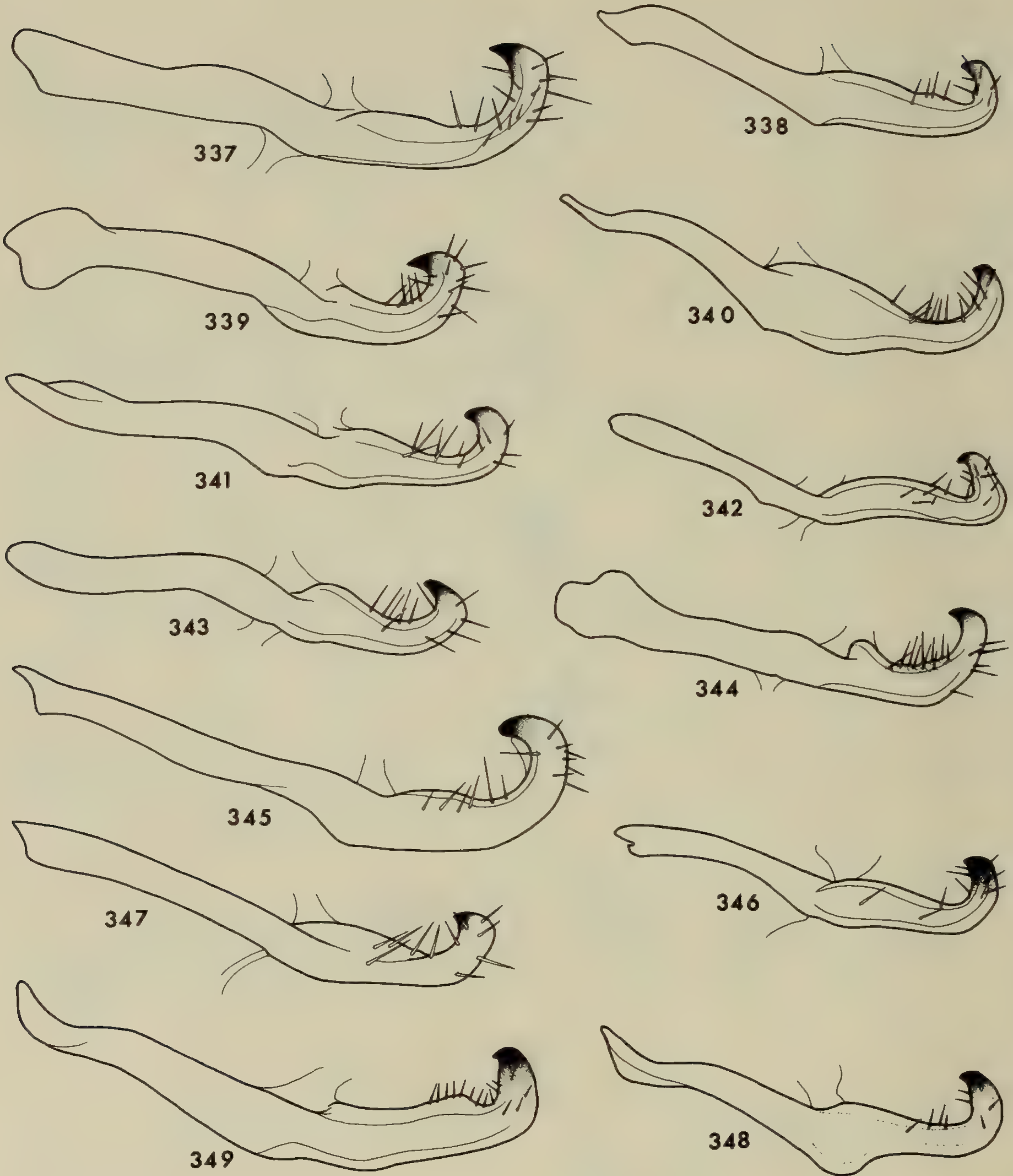
FIGS 325–336. Left lateral view of paramere of *Amastris* species. 325, *flavifolia;* 326, *unica;* 327, *vismiae;* 328, *minuta;* 329, *lycioda;* 330, *fonsecai;* 331, *exaltata;* 332, *triviale;* 333, *subangulata;* 334, *punctata;* 335, *inclinata;* 336, *froeschneri.*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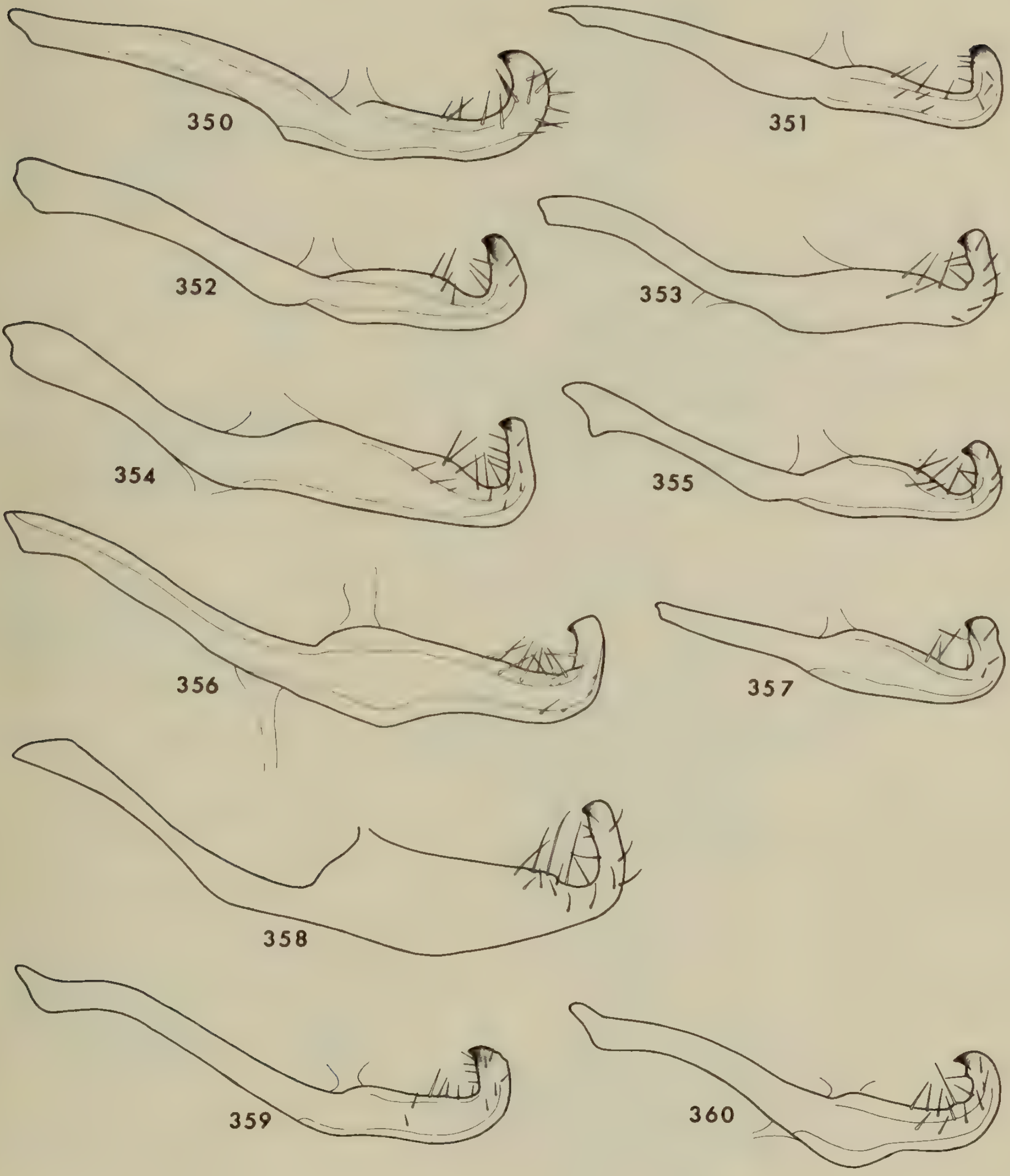
FIGS 337–349. Left lateral view of paramere of *Amastris* species. 337, *robusta*; 338, *viridisparsa*; 339, *angulata*; 340, *flava*; 341, *vicina*; 342, *reclusa*; 343, *finitima*; 344, *conspicua*; 345, *pseudoelevata*; 346, *guttata*; 347, *inconspicua*; 348, *sakikabarai*; 349, *obscura*.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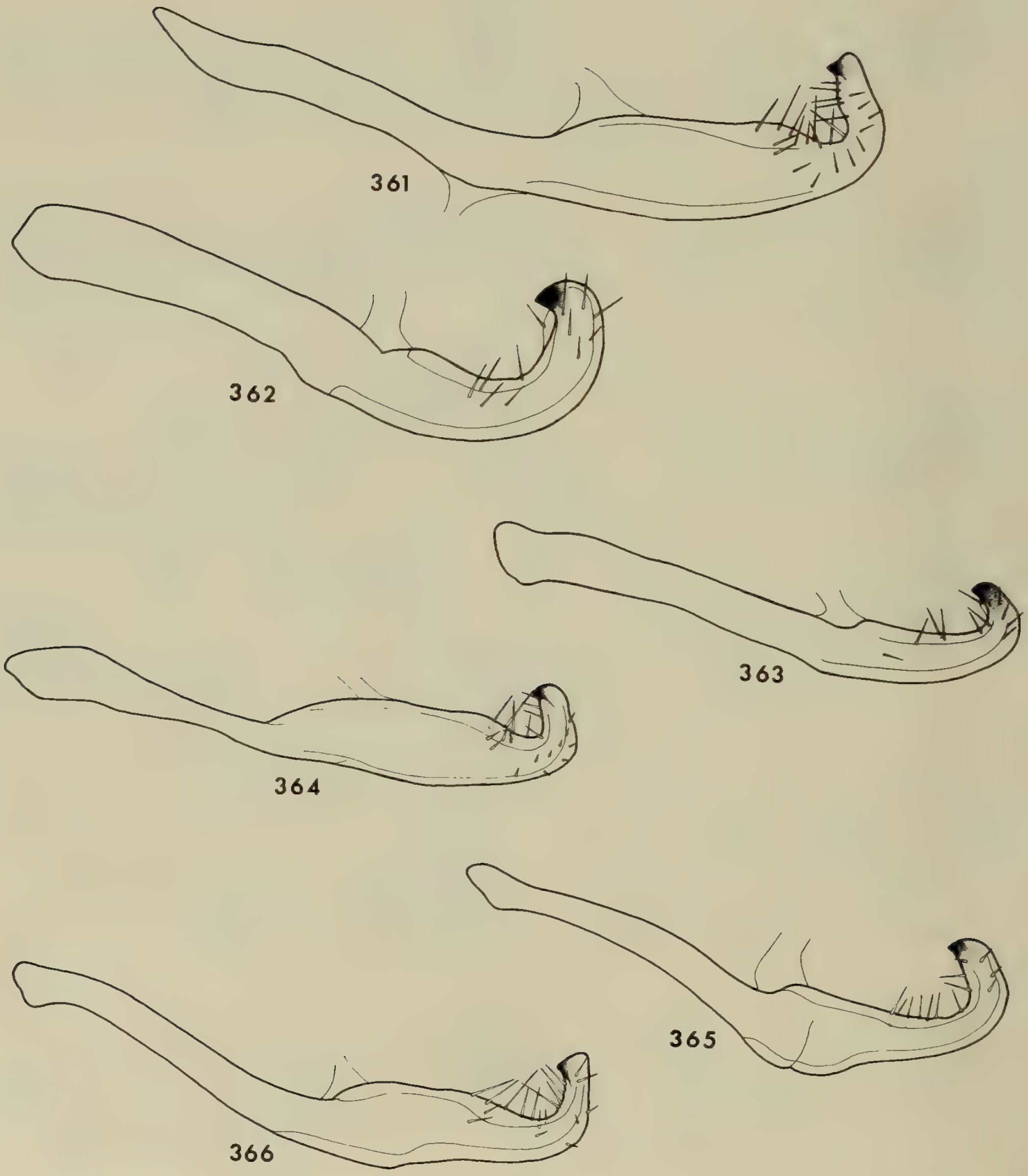
FIGS 350–360. Left lateral view of paramere of *Amastris* species. 350, *alapigmentata*; 351, *janae*; 352, *singularis*; 353, *notata*; 354, *undulata*; 355, *pseudomaculata*; 356, *evexa*; 357, *depressa*; 358, *affinis*; 359, *inornata*; 360, *maculata*.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FIGS 361–366. Left lateral view of paramere of *Amastris* species. 361, *specialis;* 362, *templa;* 363, *gregaria;* 364, *funkhouseri;* 365, *inermis;* 366, *melina.*

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